

NO. 6. — *Reports on the Results of Dredging, under the Supervision of ALEXANDER AGASSIZ, in the Caribbean Sea in 1878-79, and along the Atlantic Coast of the United States during the Summer of 1880, by the U. S. Coast Survey Steamer "Blake," COMMANDER J. R. BARTLETT, U. S. N., Commanding.**

(Published by permission of CARLILE P. PATTERSON and J. E. HILGARD, Superintendents of the U. S. Coast and Geodetic Survey.)

XX.

Report on the Ophiuroidea. By THEODORE LYMAN.

THE West Indies are the hotbed of Echinodermata. Out of less than six hundred living species of Ophiuroidea now known, about one hundred and fifty-five, or more than a quarter, are from that region; and for the round Echinoderms the proportion is even larger. Beginning at low-water mark, this fauna descends to 1,568 fathoms; and, having its centre in the Caribbean Sea and the Gulf of Mexico, it sends branches northward at least as far as South Carolina, and southward to Brazil. In the present state of knowledge, it seems a well-marked fauna, containing a great number of distinctive forms, although there occasionally occur species from other marine regions, such as *Ophioscolex glacialis* and *Astronyx Loveni*. This appearance of limitation may come in part from the special investigations in this area; for it is to be borne in mind that the U. S. ships "Corwin," "Bibb," "Hassler," and "Blake" have dredged in about 570 stations, chiefly along the line of the Antilles, and from the Dry Tortugas to Cape Florida. In addition to these, some hauls were made by Dr. William Stimpson, and by the naturalists of the "Challenger."

Nearly all known genera of Ophiuroidea are there found, the most notable exceptions being Ophioplocus, Ophioplinthus, Ophiopholis, Ophiarachna, Ophiarthrum, Ophiomastix, and Trichaster.

Among Ophiurans, as in other animals, we find that certain genera

* In this paper are included six new species from the dredgings of the "Porcupine" and the "Challenger," which are published by permission of the Lords Commissioners of the Treasury.

are very rich in species; such are *Ophioglypha*, *Amphiura*, *Ophiacantha*, and *Ophiothrix*, which contain two thirds as many species as do all the remaining sixty-eight genera in the family. A peculiar structure does not necessarily entail abundance of species, for the *Astrophyton*-like *Ophiurans* (e. g. *Ophiomyxa*) have few species.

There are included in this paper three unpublished species from the dredgings of H. B. M. ship "Porcupine," — *Ophiochiton tenuispinus*, *Ophiomyxa serpentaria*, and *Ophiobyrsa hystericis*; and from the "Challenger" expedition there are one genus and three species whose originals were found among the collections of the late Sir Wyville Thomson. They are *Ophiocopa spatula*, *Ophiacantha scolopendrica*, and *Ophiomastus texturatus*. All the rest are from the "Blake" dredgings.

The following list of species will show all new information as to the depths at which they occur, and will give some notion of their frequency, by the number of stations at which they are found.

- Ophiopæpale Goesiana.** Up to 38 fathoms.
- Ophiozona nivea.** From twenty-six stations, and in large numbers. Up to 50 fathoms.
- Ophiozona tessellata.** From seventeen stations. 60–300 fathoms.
- Ophiozona impressa.** Down to 300 fathoms.
- Ophiozona antillarum.** Ten stations. 94–508 fathoms.
- Ophioglypha Sarsii.** Found as far south as 35° 45' 30" N., and down to 306 fathoms.
- Ophioglypha lepida.** Ten stations.
- Ophioglypha falcifera.** Twelve stations. 200–508 fathoms.
- Ophioglypha variabilis.** Twenty-six stations. Up to 175 fathoms.
- Ophiomusium eburneum.** Twenty-two stations. 95–390 fathoms.
- Ophiomusium Lymani** was dredged at only nine stations, but in such quantities that Mr. Agassiz was forced to throw away a large part. These hauls illustrate the abundance of animal life at great depths; for the shallowest station was 810 fathoms.
- Ophiomusium validum.** The great number of stations (thirty-two) at which it was dredged show its frequent occurrence, as well as its variation in depth, now known to run from 60 to 1568 fathoms.
- Ophiomusium testudo.** Sixteen stations. 69–508 fathoms.
- Ophiomusium planum.** Up to 300 fathoms.
- Ophiomusium acuferum.** This humble species, described by me in 1875 from the "Hassler" dredgings, proves to be the most widely spread in that fauna. It also inhabits very diverse depths, and must accommodate itself to temperatures varying from 78° to 39° Fah. Strangely enough, it has not yet been found outside the West Indian limits. Thirty-five stations. 27–1030 fathoms.

- Ophiomusium serratum.** Thirteen stations. 124-1097 fathoms.
- Ophiomastus secundus.** Thirteen stations. 60-1131 fathoms.
- Ophiopyren longispinus.** Eighteen stations. 60-625 fathoms.
- Ophioconis miliaria.** Up to 163 fathoms.
- Ophiochœta mixta.** Down to 572 fathoms.
- Ophiactis Müllerii** var. **quinqueradia.** 27-338 fathoms.
- Amphiura duplicata,** like *Ophioglypha variabilis* and *Ophiomusium acuferrum*, is plentiful, and is found over a great range of depth. Thirty-four stations.
- Amphiura Otteri.** There is some question about the distinction of those species that stand near the old *A. Chiajei*. I believe, however, that Ljungman's species was found by the "Blake" from 41° 32' 50" N. to the island of Grenada on the south, and from 175 to 576 fathoms.
- Amphiura tumida.** Up to 94 fathoms.
- Amphiura lunaris.** Up to 424 fathoms.
- Amphiura cuveata.** 159-370 fathoms.
- Amphiura Stimpsoni.** Down to 69 fathoms.
- Ophionereis reticulata.** Down to 94 fathoms.
- Ophioplax Ljungmani.** Eleven stations. Down to 175 fathoms.
- Ophiostigma isacanthum.** Down to 122 fathoms.
- Ophiacantha bidentata.** From as far south as 33° 27' 20" N.
- Ophiacantha hirsuta.** Twelve stations. 82-955 fathoms.
- Ophiacantha sertata.** Ten stations. 150-411 fathoms.
- Ophiacantha vepratrica.** Seven stations. Up to 291 fathoms.
- Ophiacantha scutata.** Nine stations. 124-338 fathoms.
- Ophiacantha echiulata.** Up to 303 fathoms.
- Ophiacantha pentacrius.** Twenty-four stations. Down to 625 fathoms.
- Ophiacantha stellata.** Twelve stations. 56-262 fathoms.
- Ophiacantha aspera.** Twelve stations. 73-262 fathoms.
- Ophiomitra valida.** Twenty-four stations. Down to 1105 fathoms. Another abundant species, of great range in depth.
- Ophiocamax hystrix.** Fifteen stations. 114-300 fathoms.
- Ophiothamnus vicarius.** Six stations. Down to 611 fathoms.
- Ophiothrix Suensonii.** Twenty-one stations. Down to 262 fathoms.
- Ophiothrix angulata.** Fourteen stations. Down to 262 fathoms.
- Ophioscolex tropicus.** 103-502 fathoms.
- Ophiomyces mirabilis.** Down to 422 fathoms.
- Ophiomyces frutescosus.** Down to 288 fathoms.
- Ophiochondrus convolutus.** Eleven stations. Up to 88 fathoms.
- Sigsbeia murrhina.** Twenty-one stations.
- Gorgonocephalus mucronatus.** Down to 288 fathoms.
- Astrogomphus vallatus.** 114-337 fathoms.
- Astroporpa annulata.** Sixteen stations. Down to 163 fathoms.
- Astrochele Lymani.** Down to 980 fathoms.
- Astroschema arenosum.** Eight stations. Up to 120 fathoms.

- Astroschema læve.** Sixteen stations. 56-262 fathoms.
Astroschema oligactes. Seventeen stations.
Astroschema tenue. Four stations. 88-124 fathoms.
Ophiocreas lumbricus. Seven stations. Down to 580 fathoms.
Ophiocreas œdipus. Down to 580 fathoms.
Astronyx Loveni (young). Down to 980 fathoms.

Ophiura Elaps ? LYM.

These fine specimens, of which the largest had a disk of 28 mm. and arms of about 200 mm., only differed from Lütken's description (Addit. ad Hist. Oph., Pt. II. p. 93) in having six or seven, instead of seven or eight arm-spines, of which the upper ones were longest.

Station (Bartlett) 29, 21° 23' 19" N., 82° 54' 42" W., 300 fathoms. Station 157, Montserrat, 120 fathoms. Station 241, Grenadines, 163 fathoms.

Ophiura brevispina LYM.

Station 142, Flannegan Passage, 27 fathoms. Station 152, St. Kitts, 122 fathoms. Station 285, Barbados, 13-40 fathoms.

Ophiura cinerea LYM.

Station 132, Santa Cruz, 115 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms.

Pectinura tessellata sp. nov.

Plate III. Figs. 1-3.

Special Marks. — One tentacle-scale : four or five short arm-spines. Under arm-plates narrow and rounded. Granulation of disk continuous above, but with naked patches below.

Description of an Individual (Station 130). — Diameter of disk 17.5 mm. Length of arm about 95 mm. Width of arm close to disk 4 mm. Sixteen stout mouth-papillæ to each angle, whereof the one next the outermost is much the widest and stoutest, while those within grow gradually narrower and more peg-like. Four flat, stout, short teeth, the lowest one of which is sometimes cleft. Mouth-shields wide heart-shape with a rounded point within. The supplementary shield lies just outside and forms one of a number of thick naked plates which partly cover the lower interbrachial space. Side mouth-shields three-cornered and very small, lying next the outer corners of the mouth-shields. Under arm-plates occupying less than half the width of the arm ; as long as broad ; bounded without by a curve, within by a truncated

angle, and on the sides by a re-entering curve. Side arm-plates occupying about two thirds of the height of the arm, and having a cleanly curved outer side. Upper arm-plates arched (but not so strongly as in *O. heros*), wider without than within, and having straight outer and inner sides. Disk angular, closely and evenly covered above, except the radial shields, with a fine granulation having about six grains in the length of 1 mm. Interbrachial spaces below have a reticulated look, from the numerous bare plates among the granulation. Radial shields wide oval; length to breadth, 2.3 : 1.8. Genital opening long, extending from mouth-shield nearly to edge of disk. Four or five small, peg-like, even, spaced arm-spines, a little more than half the length of a joint. One stout, round tentacle-scale.

Station 130, near Frederickstadt, 451 fathoms, 1 specimen.

This species is well distinguished from *P. heros* and *P. lacertosa* by a flatter arm, four or five peg-like spaced arm-spines, and naked plates in the lower interbrachial space.

Pectinura lacertosa sp. nov.

Plate III. Figs. 4-6.

Special Marks.—Three arm-spines about as long as a joint and standing low down on side of arm. Indentations, but no pores, between the first four or five lower arm-plates. Arms short; only three and a half or four times the diameter of the disk. One large, round tentacle-scale.

Description of an Individual (Station 258).—Diameter of disk 35 mm. Length of arm about 135 mm. Width of arm close to disk, without spines, 6 mm. About twenty mouth-papillæ to each angle, whereof the two or three outer ones are wide and squarish, while those within are sharp and peg-like. The two lowest teeth are replaced by similar papillæ. Mouth-shields short heart-shape with a rounded angle within; length to breadth, 4 : 5. There are sometimes one or more large scales, or supplementary pieces, just outside. Side mouth-shields very small and nearly obliterated. Under arm-plates about as wide as long, bounded without by a curve, within by a truncated angle, and on the sides by a re-entering curve. Side arm-plates low, occupying only about one half the height of the arm, and meeting neither above nor below. Upper arm-plates highly arched, closely overlapping, with outer and inner edges nearly straight; each is usually broken in two pieces. Disk angular, closely and evenly covered with very fine granules, 7 or 8 in the length of 1 mm., except the radial shields and sometimes a small plate on the margin. Radial shields egg-shaped, somewhat longer than broad with outer and inner ends much rounded; length to breadth, 4 : 2.5. Lower interbrachial space covered by a similar granulation, extending even to the mouth-angle. There are none on the mouth-shields, outside which are one or more thick, partially naked scales, representing the supplementary shield. Genital opening long, extending from mouth-shield nearly to margin of disk. Three, some-

times four, stout, rounded, tapering arm-spines, not quite as long as a joint. One round, thick tentacle-scale. Color in alcohol, nearly white.

Station 258, near Grenada, 159 fathoms, 1 specimen.

This species is very near *P. heros*, dredged in 900 fathoms by the "Challenger," near New Guinea, but differs in its longer and differently placed arm-spines, and in the indentations between the basal under arm-plates.

Pectinura angulata sp. nov.

Plate III. Figs. 7-9.

Special Marks. — Disk with thin scales covered by a fine granulation. Nine arm-spines, of which the lowest is longest and broad and flat. Pores only between the first three under arm-plates.

Description of an Individual (Station 134). — Diameter of disk 27 mm. Width of arm close to disk 5.5 mm. About twenty mouth-papillæ to each angle, of which the two or three outer ones are much the widest and are squarish, while those within are spiniform. The lowest of the five broad, flat teeth is split in two, and there are sometimes one or two additional papillæ at the apex of the mouth-angle. Under arm-plates within the disk wider than long, bounded without by a curve, within by a wide much-truncated angle, and on the sides by re-entering curves. Further out they are as long as broad and nearly octagonal. They are stout but not swollen, and there are pairs of pores between the first three. Side arm-plates with a gently curved outer edge, and occupying nearly the whole height of the arm. Upper arm-plates smooth, nearly flat, regular, with straight outer and inner sides, and the outer corners rounded. They occupy nearly the whole upper surface. Length to breadth, 1.5 : 4. Mouth-shields short heart-shape, with a rounded angle within. Length to breadth, 4 : 5.5. Supplementary shields small, and swollen; length to breadth, 1 : 1.3. Side mouth-shields reduced to a little plate, at the outer corner of the mouth-shield. Disk angular, and covered by a close, fine granulation, which is easily rubbed off, as is shown in the figure. There are about seven grains in the length of 1 mm. Radial shields naked, of a narrow oval shape and pointed within; length to breadth, 4 : 2. The scale-coat of the disk is of thin delicate scales about 1 mm. in length. Arm-spines nine, the eight uppermost slender, pointed, and flattened, and about three fourths the length of a joint. The lowest one is much wider, blunt, and longer than a joint. Two tentacle-scales of a short spatula-shape: the upper one covering the base of the lowest arm-spine. On the first tentacle-pore there are usually two supplementary scales placed just outside the pore. Color in alcohol, nearly white.

Station 134, near Santa Cruz, 248 fathoms, 1 specimen. Station 232, St. Vincent, 88 fathoms.

This species is nearest *P. rigida*, from which it is distinguished by a shorter under arm-spine, larger radial shields, coarser disk-scales, and pores between the under arm-plates extending only to three joints.

In other specimens the granulation was uninterrupted over the disk, except small spots at the radial shields. The supplementary mouth-shield is often very small, and ill marked.

Ophiopæpale Goesiana Lxn.

Station 101, Morro Light, 175-250 fathoms. Station 132, Santa Cruz, 115 fathoms (young). Station 127, Santa Cruz, 38 fathoms. Station 155, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 253, Grenada, 92 fathoms. Station 269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 293, Barbados, 82 fathoms. Station 297, Barbados, 123 fathoms.

Ophiozona marmorea sp. nov.

Plate III. Figs. 10-12.

Special Marks. — Arms very stout and short (two and a half times diameter of disk), with strongly projecting side arm-plates and small sunken upper arm-plates. Side mouth-shields much swollen. Lower interbrachial spaces with scattered grains.

Description of an Individual (Station 164). — Diameter of disk 8 mm. Length of arm 19 mm. Width of arm next disk 2.3 mm. Five short, blunt, crowded angular papillæ to each mouth-angle, and, at the apex, the lowest of the short teeth; the outer papillæ are largest. Mouth-shields small, much larger than broad, five-sided with a curve without and an angle within; length to breadth, 1.2 : .8. Side mouth-shields larger than mouth-shields proper; much swollen, rudely triangular, and meeting fully within. First under arm-plate small and pentagonal, with a long angle inward; those beyond are much larger, but still cover only about a third of the arm's width; they are much wider without than within, with a sharp peak on the outer corners, and re-entering curves on the lateral sides; length to breadth, 1.2 : .8. Side arm-plates large and swollen, but meeting neither above nor below. Upper arm-plates small and sunken, fan-shaped, with a truncated angle inward; they cover not more than a third of the upper surface. Disk covered by large, thick, swollen rounded plates, with a central rosette of primaries and a radiating row of three in each interbrachial space. Radial shields longer than broad, rounded and swollen, separated by a wedge of two or three scales; length to breadth, 2.3 : 2; between their outer ends and the arm is a row of narrow plates. Interbrachial spaces below covered on either side by stout genital scales, and in the middle by a single row of two or three swollen plates; they bear a scattered granulation. Genital openings long, extending from sides of radial shields to margin of disk. Four short, stout, tapering, blunt, equal arm-spines, about two thirds as long as a joint. Two large oval tentacle-scales to each pore. Color in alcohol, white.

Station 101, 175-250 fathoms, 1 specimen. Station 134, 248 fathoms, 3

specimens. Station 158, 148 fathoms, 1 specimen. Station 164, Guadeloupe, 150 fathoms, 11 specimens. Station 220, 160 fathoms, 1 specimen. Station 224, 114 fathoms, 1 specimen.

O. marmorca is nearest *O. nivea*, from which it differs in its swollen disk-plates, side arm-plate and side mouth-shields, its smaller upper arm-plates, and shorter arms, and in granulation on the lower interbrachial space.

Ophiozona clypeata sp. nov.

Plate III. Figs. 13-15.

Special Marks.—Eleven close-set, lumpy mouth-papillæ to each angle. Side mouth-shields large and wide. Three moderately stout arm-spines, about as long as a joint.

Description of an Individual (Station 219).—Diameter of disk 10 mm. Length of arm 65 mm. Width of arm near disk 2 mm. Eleven short, lumpy, crowded mouth-papillæ to each angle, whereof the one next the outermost is widest. Mouth-shields blunt spear-head shape, with the point inward; length to breadth, 1.5 : 1. Side mouth-shields rather wide and fully meeting within. Under arm-plates thick, but not ridged, much wider without than within where they are bounded by a wide truncated angle, while the outer is a broken curve and the lateral sides are re-entering curves. Side arm-plates short and stout, with a low spine-ridge. Upper arm-plates twice as broad as long, and much wider without than within. Disk round and flat, covered with distinct rounded slightly swollen overlapping scales, among which the primaries are conspicuous by their greater size. Radial shields short, oval; length to breadth, 1.2 : 8. In the interbrachial spaces below, the scales are of uniform size, about three in the length of 1 mm. Genital openings long, extending from outer corners of the mouth-shield quite to margin of disk. Three moderately stout, cylindrical, tapering, blunt arm-spines; the two upper ones as long as a joint, the lowest a little longer. Two rudely semicircular tentacle-scales on the side arm-plate, whereof the one next the under arm-plate is smaller. Color in alcohol, nearly white.

Station 219, off Saint Lucia, 151 fathoms, 1 specimen. Station 232, St. Vincent, 88 fathoms.

By its smaller disk-scales and longer and more pliable arms this species connects the large-scaled and stiff-armed *Ophiozonæ* with the type *O. impressa*. It shows, too, the affinity of the genus to *Ophiochiton* through *O. lentus*.

Ophiozona nivea LAM.

Station 129, Santa Cruz, 314 fathoms. Station 145, St. Kitts, 270 fathoms. Station 146, St. Kitts, 245 fathoms. Station 147, St. Kitts, 250 fathoms. Station 148, St. Kitts, 208 fathoms. Station 154, Montserrat, 298 fathoms. Station 155, Montserrat, 88 fathoms. Station 172, Guadeloupe, 62-180 fathoms.

oms. Station 183, Dominica, 252 fathoms. Station 208, Martinique, 213 fathoms. Station 209, Martinique, 189 fathoms. Station 210, Martinique, 191 fathoms. Station 215, St. Lucia, 226 fathoms. Station 216, St. Lucia, 154 fathoms. Station 218, St. Lucia, 164 fathoms. Station 219, St. Lucia, 151 fathoms. Station 224, St. Vincent, 114 fathoms. Station 238, Grenadines, 127 fathoms. Station 241, Grenadines, 163 fathoms. Station 258, Grenada, 159 fathoms. Station 273, Barbados, 103 fathoms. Station 274, Barbados, 209 fathoms. Station 280, Barbados, 221 fathoms. Station 291, Barbados, 200 fathoms. Station 292, Barbados, 56 fathoms. Station 294, Barbados, 137 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms, sp. ?

Ophiozona tessellata LYM.

Station 134, Santa Cruz, 248 fathoms. Station 149, St. Kitts, 60-150 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 158, Montserrat, 148 fathoms. Station 166, Guadeloupe, 150 fathoms. Station 206, Martinique, 170 fathoms. Station 208, Martinique, 213 fathoms. Station 220, St. Lucia, 116 fathoms. Station 231, St. Vincent, 95 fathoms. Station 238, Grenadines, 127 fathoms. Station 273, Barbados, 103 fathoms. Station 282, Barbados, 154 fathoms. Station 290, Barbados, 73 fathoms. Station 297, Barbados, 123 fathoms. Station 299, Barbados, 140 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms.

Ophiozona impressa LYM.

Station 132, Santa Cruz, 115 fathoms. Station 272, Barbados, 76 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms. Station 298, Barbados, 120 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms.

Ophiozona antillarum LYM.

Station 136, Santa Cruz, 508 fathoms. Station 204, Martinique, 476 fathoms. Station 205, Martinique, 334 fathoms. Station 208, Martinique, 213 fathoms. Station 211, Martinique, 357 fathoms. Station 273, Barbados, 103 fathoms. Station 276, Barbados, 94 fathoms. Station 288, Barbados, 399 fathoms. Station 291, Barbados, 200 fathoms. Bartlett, Station 24, 5 m. E. of Cape Cruz, S. side of Cuba, 206 fathoms.

Ophiothyreus Goesii LYN.

Station 101, Morro Light, 175-250 fathoms. Station 155, Montserrat, 88 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms.

Ophiernus adpersus sp. nov.

Plate III. Figs. 19-21.

Special Marks. — Two or three small, unequal arm-spines. Arms flat and very wide, their width being about one third the diameter of the disk. Mouth-frames narrow and prolonged.

Description of an Individual (Station 150). — Diameter of disk 13 mm. Width of arm close to disk 4 mm. Four short, rounded, bead-like, close-set papillæ on either side of the narrow, prolonged mouth-angle, and three longer ones under the teeth, which are five in number and are short and stout. There are also three or four bead-like papillæ on the side mouth-shield, and a much wider one outside them, all of which may be considered as scales of the second pair of mouth-tentacles. Mouth-shields about as broad as long, — 1.6 : 1.6, — of an angular heart-shape, with the point inward. Side mouth-shields long triangular, embracing the sides of the mouth-shields and not quite meeting within. First under arm-plate small and swollen, of an irregular rounded shape. The plates beyond are narrow, with lateral sides re-enteringly curved opposite the tentacle-pores. They are very small, and occupy not more than a quarter of the width of the arm. Side arm-plates wide, thin, and flat; they do not quite meet below, and are broadly separated above by the upper arm-plates, which cover all that surface of the arm; they are thus feebly arched, much wider than long, wider without than within, and having the outer and inner margins straight. Disk flat, with re-entering curves over the arms; covered by thin, flat, irregular, strongly overlapping, ill-defined scales, which are beset with minute granules, of which there are about eight in the length of 1 mm. where they are closest. Radial shields nearly naked, of an irregular pear-seed shape, with the point inward, widely separated by the disk-scaling, and nearly naked; length to breadth, 4 : 2. Lower interbrachial spaces more finely and regularly scaled. Genital openings long and wide, with a broad genital scale at the outer end. Arm-spines two, rarely three; they are slender and peg-like. The upper one is longest, and about half as long as a joint. Two, rarely three, small, flat, oval tentacle-scales standing on the side arm-plate. Color in alcohol, pale gray. The fragile arms are long and slender, being about nine times the diameter of the disk. In its natural state the disk is probably closely granulated, but the grains are easily rubbed off.

The wide arms and different mouth-angles distinguish it from *O. vallincola*.

Station 129, Frederickstadt, 314 fathoms. Station 130, Santa Cruz, 451 fathoms. Station 150, between St. Kitts and Nevis, 375 fathoms. Station 148, St. Kitts, 208 fathoms. Station 161, Guadeloupe, 583 fathoms. Station 176, Dominica, 391 fathoms. Station 185, Dominica, 333 fathoms. Station 188, Dominica, 372 fathoms. Station 190, Dominica, 542 fathoms. Station 196, Martinique, 1,030 fathoms. Station 221, St. Lucia, 423 fathoms. Station 222, St. Lucia, 422 fathoms. Station 226, St. Vincent, 424 fathoms. Sta-

tion 230, St. Vincent, 464 fathoms. Station 239, Grenadines, 338 fathoms. Station 258, Grenada, 159 fathoms. Station 260, Grenada, 291 fathoms. Station 264, Grenada, 416 fathoms. Station 288, Barbados, 399 fathoms. Station 291, Barbados, 200 fathoms. Capt. Bartlett, 1880, Lat. $17^{\circ} 30' N.$, Long. $79^{\circ} 14' W.$, 555 fathoms; also, $17^{\circ} 45' N.$, $77^{\circ} 58' W.$, 322 fathoms.

Ophioglypha fasciculata sp. nov.

Plate III. Figs. 22-24.

Special Marks. — Four spaced arm-spines. Upper surface of thick disk chiefly covered by radial shields, rosette of primary plates and large plate in each interbrachial space; no large plate on margin. Basal under arm-plates broader than long. Whole surface microscopically tuberculous. Papillæ of arm-comb flattened spiniform.

Description of an Individual. — Diameter of disk 13 mm. Width of arm near disk 3 mm. Three or four rectangular, crowded papillæ on each side of a mouth-angle, and two or three conical ones at its apex. Mouth-shields very large, much longer than broad, having the outline of a wide-mouthed jug, and with the small lobe-like end inward; length to breadth, 3:2. Side mouth-shields narrow, and of nearly equal width, meeting fully within. First under arm-plate larger than any other, longer than wide, narrower within than without; the rest, within disk, are wider than long, and four-sided; those beyond become gradually hexagonal. Side arm-plates swollen, meeting neither above nor below. Basal upper arm-plates more than twice as broad as long, with well-marked angles at their lateral ends. Disk thick, covered above by a central rosette of large primary plates and a large plate in each interbrachial space; on margin of disk are a lot of small scales, and a single line between the chief plates. Lower interbrachial spaces partly covered by large mouth-shield, and partly by imbricated scales. Radial shields longer than wide, irregular and somewhat angular in outline, joined for about half their length. Genital scales narrow next radial shield, but growing wider without; they bear on their free edge a continuous but not crowded line of small, sharp papillæ, which on the upper side of arm become spiniform, and form the comb. Four spaced arm-spines about two thirds as long as a joint. Tentacle-pores large; mouth-tentacles with a straight line of five or six small, squarish, crowded scales on either side; the others, within the disk, have usually five on the side arm-plate, and two or three on the under arm-plate. Color in alcohol, pale gray.

Station 281, Barbados, 288 fathoms, 2 specimens.

O. bullata is nearest, but differs in finer disk-scales, large marginal plates, separated radial shields, differently shaped arm-comb papillæ, and only three minute arm-spines.

Ophioglypha abyssorum sp. nov.**Plate III. Figs. 25-27.**

Special Marks. — Surface microscopically tuberculous. Arm-spines rudimentary, or wanting. No papillæ along genital scale on the under surface, and only two or three in each arm-comb. Side arm-plates not swollen.

Description of an Individual. — Diameter of disk 11 mm. Width of arm near disk 2 mm. Four or five rectangular, crowded papillæ on either side of a mouth-angle, and one diamond-shaped (lowest tooth) at apex. Mouth-shields wide angular heart-shape, with a peak inward; length to breadth, 2.5 : 2. Side mouth-shields rather wide, and meeting fully within. First under arm-plate larger than the rest, longer than wide, bell-shaped with a very gentle curve without, and a long curve within; the next two plates are wider than long, rounded pentagonal with an angle inward; those beyond are smaller, almost transverse diamond in form, with outer side gently curved. Side arm-plates meeting fully below; also above, beyond the first two upper arm-plates, which are rounded diamond-shape with the inner angle truncated; those beyond are as broad as long, and diamond-shaped with rounded angles. Disk smooth and not very thick, having in the centre a large, round primary plate, which is separated from the other five by a circle of smaller angular plates, similar to those which cover the rest of the disk, some of which are, however, larger. Radial shields large and a little sunken, of a short, irregular pear-seed shape, almost wholly separated by an outer and an inner wedge of disk-scales; length to breadth, 3 : 2.3. Interbrachial spaces below chiefly filled by two large central plates and the broad genital scales, which bear no papillæ on their free edge. It is only on the upper surface of the arm, just outside the radial shields, that a rudimentary comb is found, made up of two or three block-like papillæ. The joints within the disk have one or two rudimentary spines, the rest none. Mouth-tentacle pores surrounded by eight or nine small, crowded block-like scales; the next two have five such scales; those beyond, one very minute papilla, or none. Color in alcohol, pale gray.

Station 140, Virgen Gorda, 1,097 fathoms, 5 specimens.

The species differs from *O. confragosa* in its even, microscopically tuberculated surface, its side arm-plates not swollen, under arm-plates of a different shape, and arm-spines rudimentary or wanting.

Ophioglypha scutata sp. nov.**Plate IV. Figs. 28-30.**

Special Marks. — Upper disk chiefly covered by large radial shields and primary plates, with two plates in each interbrachial space. Papillæ of genital scale blunt, and forming above a close row. Three little arm-spines about one third as long as a joint.

Description of an Individual (Station 231).— Diameter of disk 6 mm. Width of arm close to disk 1 mm. Three short, oblong, close-set papillæ on each side of mouth-angle, and at its apex a group of three smaller and bluntly pointed ones, whereof the centre one is largest. Mouth-shield rounded quadrangular, with an angle inward; length to breadth, 1:1. Side mouth-shields rather short and narrow, running along inner angle of mouth-shield. First under arm-plate large and triangular, with a curved outer side. The next three plates wider than long, with a gently curved outer side, an obtuse angle within, and re-entering curves on the sides. The plates beyond grow suddenly smaller, and are much wider than long. Side arm-plates large and a little swollen, meeting above and below. Upper arm-plates three-sided, with an angle inward. Disk flat, and covered above in the centre by a group of six large primary plates, whereof the middle one is pentagonal, and the rest rounded. Outside these are two large elongated plates, placed end to end and occupying the interbrachial space. The remaining upper surface is covered by very large radial shields, which are as wide as long, and of irregular outline, joined for their whole length, except at the inner point, where they are separated by a small scale; length to breadth, 1.2:1.3. The lower interbrachial space is almost wholly occupied by a large hexagonal plate lying outside the mouth-shield and the rather wide genital scales, which bear blunt, bead-like papillæ continued in an unbroken line over top of arm just along outer edge of part of the radial shield. Three short, equal, stout, peg-like arm-spines, about one third as long as a joint. First three tentacle-pores, with three humpy close-set scales on each side. The fourth has two scales on either side, and those beyond have none. Color in alcohol, white.

Station 231, off St. Vincent, 95 fathoms, 1 specimen.

This specimen is probably not adult, but its characters are so marked that there seems no doubt of its novelty. In the small number and large size of its disk-plates, it resembles *O. minuta*.

Ophioglypha tenera sp. nov.

Plate IV. Figs. 31-33.

Special Marks.— Three short, blunt, spaced arm-spines, less than half as long as a joint. Disk-scales somewhat swollen and mostly large. Radial shields joined for a part of their length. Papillæ of arm-comb close-set, flat, and with rounded ends.

Description of an Individual.— Diameter of disk 5.5 mm. Width of arm 1.2 mm. Mouth-angles large and regular, bearing on each side five or six low papillæ, which are much crowded, and form a straight line; the outermost are much longer than high, while the inner ones are almost bead-like; at the apex and on the jaw-plate are two spiniform papillæ, between which appears the lowest tooth. Mouth-shields five-sided, bounded within by a well-marked angle, and without by a curve; length to breadth 1.2:1. Side mouth-shields

narrow and tapering within, where they join. First under arm-plate as broad as long, four-sided with much rounded corners. Those beyond have essentially a five-sided outline, but the second plate has its corners much rounded, while the others are more regular and have a well-marked peak within. Side arm-plates meeting below, but not above next the disk; slightly flaring so as to make a distinct shoulder, which carries the spines. Upper arm-plates broad wedge-shape, with an angle inward, which in the first two is truncated. Upper surface of disk with a central rosette of six slightly swollen, irregularly rounded primary plates, outside which is the great plate which separates the ends of the radial shields, and, in the interbrachial space, two other large plates, one of which is on the margin. Besides these there are numerous small intercalated scales. Interbrachial spaces below covered by half a dozen irregular angular plates; besides which the narrow genital plates appear running along the genital openings quite to the margin of the disk. A row of fine papillæ stands on the edge of the genital scale, which grow suddenly larger, as the plate passes to the top of the arm, and form a close comb of flattened papillæ with rounded ends. Three small, equal, peg-like, spaced arm-spines, less than half as long as a joint. Mouth-tentacles with five or six minute, bead-like scales on each side; the next have three or four; the second and third have three on the side arm-plates, and the fourth, one. Color in alcohol, pale gray.

Station 269, off St. Vincent, 124 fathoms, 4 specimens.

This species stands nearest *O. costata*, but has longer arm-spines, disk-scales more swollen and separated, side arm-plates more flaring, and radial shields joined.

Ophioglypha aurantiaca VLL.

VLL., Amer. Journ. Sci., XXIII. p. 141, 1882.

Plate IV. Figs. 34-36.

Special Marks.—Disk covered by a smooth skin, through which the scales of the upper surface are scarcely to be made out, while those of the lower surface are more distinct. Three wide, flattened arm-spines, the upper one longer than an arm-joint, the others not so long. No comb above the base of the arm.

Description of an Individual (Station 312).—Diameter of disk 11.5 mm. Width of arm close to disk 2.5 mm. About eleven small, bead-like, slightly spaced mouth-papillæ to each angle. Four or five small spear-head-shaped teeth. Mouth-shield very wide heart-shaped, with an obtuse angle inward; length to breadth, 2:1. Side mouth-shields long, with an irregular outline, and widest at their outer ends. First under arm-plate rounded hexagonal, and about as broad as long. The next two are of an irregular transverse oval shape, and those immediately beyond are much wider than long with a curve without and a peak within. Side arm-plates clinging close to the arm,

and but slightly swollen, scarcely meeting below near base of arm, and separated above by four-sided upper arm-plates, which are as broad as long, and have the outer side curved, and the laterals straight. Disk round, smooth, and somewhat swollen, covered by skin, through which the scaling of the upper surface is only vaguely indicated. In the lower interbrachial spaces the scales are plainly indicated; they are thin, rounded, pretty even, and about three in the length of 2 mm. When the specimen is dry the scales are of course more distinct. Radial shields small, irregularly three-sided; widely separated, except at their outer ends, which overhang the arm. Along the edge of the genital opening, whose scale is completely obscured, runs a line of minute, sharp papillæ, which stops at the disk margin and does not pass upwards to form an arm-comb. Three wide, flattened, slightly rough arm-spines, whereof the uppermost is longer than a joint, the middle one as long as a joint, and the lowest one shortest and somewhat tapering. Each mouth-tentacle is surrounded by about ten small, bead-like, close-set scales; the next pore has six, and those beyond two, which stand on the side arm-plate. Color in alcohol, pale gray; of living animal, bright orange (Verrill).

Station 312, 39° 50' 45" N., 70° 11' W., 466 fathoms. Station 306, 41° 32' 50" N., 65° 55' W., 524 fathoms, 2 specimens.

A young one, with a disk of 4 mm., had more slender arm-spines, the back scaling less indistinct, and the under arm-plates narrower and more widely separated.

This species is nearest *O. flagellata*, but differs in having shorter arm-spines, and in wanting an arm-comb.

Ophioglypha affinis?

Station 344, 40° 1' N., 70° 58' W.

Ophioglypha confragosa Lym.

Station 312, 39° 50' 45" N., 70° 11' W. Young.

Ophioglypha Sarsii Lym.

Station 346, 40° 25' 35" N., 71° 10' 30" W., 44 fathoms. Station 332, 35° 45' 30" N., 74° 48' W., 263 fathoms. Station 344, 40° 1' N., 70° 58' W., 129 fathoms. Station 303, 41° 34' 30" N., 65° 54' 30" W., 306 fathoms.

Ophioglypha lepida Lym.

Station 228, St. Vincent, 785 fathoms. Station 307, 41° 29' 45" N., 65° 47' 10" W., 980 fathoms. Bartlett, Station 14, Grand Cayman Island, 608 fathoms. Station 308, 41° 24' 45" N., 65° 35' 30" W., 1,242 fathoms. Bartlett, Station 18, 18° 20' 30" N., 87° 16' 40" W., 600 fathoms. Station 330,

31° 41' N., 74° 35' W., 1,047 fathoms. Station 339, 38° 16' 45" N., 73° 10' 30" W., 1,186 fathoms. Station 340, 39° 25' 30" N., 70° 58' 40" W., 1,394 fathoms. Station 341, 39° 38' 20" N., 70° 56' W., 1,241 fathoms.

Ophioglypha Stuwitzii var.?

Station 321, 32° 43' 25" N., 77° 20' 30" W., 233 fathoms.

Ophioglypha acervata LYM.

Station 132, Santa Cruz, 115 fathoms. Station 143, Saba Bank, 150 fathoms. Station 149, St. Kitts, 60-150 fathoms. Station 177, Dominica, 118 fathoms. Station 253, Grenada, 92 fathoms. Station 259, Grenada, 159 fathoms. Station 262, Grenada, 92 fathoms. Station 316, 32° 7' N., 78° 37' 30" W., 229 fathoms. Station 315, 32° 18' 20" N., 78° 43' W., 225 fathoms.

NOTES ON OPHIOGLYPHA.

Ophioglypha falcifera LYM.

Plate IV. Figs. 37-39.

In the original description (Bull. Mus. Comp. Zoöl., I., No. 10, p. 320) I said: "We may look for an adult of this curious species about the size of *O. Sarsii*, or rather smaller, and having a large number of small plates on the disk."

A considerable number of specimens were brought in by this expedition, of which the largest had a disk of 13 mm., and the arm 52 mm. long. The disk was covered by coarse, well-defined scales, the interbrachial margin being almost wholly occupied by a single plate. The hook-like form of the middle arm-spine could be traced to within half a dozen joints of the disk.

Station 130, Frederickstadt, 451 fathoms. Station 136, Frederickstadt, 508 fathoms. Station 185, Dominica, 333 fathoms. Station 188, Dominica, 372 fathoms. Station 195, Martinique, 502½ fathoms. Station 204, Martinique, 476 fathoms. Station 221, St. Lucia, 423 fathoms. Station 222, St. Lucia, 422 fathoms. Station 226, St. Vincent, 424 fathoms. Station 230, St. Vincent, 464 fathoms. Station 265, Grenada, 576 fathoms. Station 291, Barbados, 200 fathoms.

Ophioglypha variabilis LYM.

Specimens from about thirty stations showed a good deal of variation. Some were like Fig 70, Pl. III., Bull. M. C. Z. V., No. 7, while others had two or three vertical rows of scales in the lower interbrachial spaces. The scales on the back of the disk also varied in size and number. Likewise the second or under arm-comb had sometimes numerous and sometimes very few papillæ.

Station 101, Morro Light, 175-250 fathoms. Station 130, Frederickstadt, 451 fathoms. Station 136, Frederickstadt, 508 fathoms. Station 137, Frederickstadt, 625 fathoms. Station 148, St. Kitts, 208 fathoms. Station 161, Guadeloupe, 583 fathoms. Station 162, Guadeloupe, 734 fathoms. Station 163, Guadeloupe, 769 fathoms. Station 173, Guadeloupe, 734 fathoms. Station 174, Guadeloupe, 878 fathoms. Station 175, Dominica, 608 fathoms. Station 179, Dominica, 824 fathoms. Station 185, Dominica, 333 fathoms. Station 188, Dominica, 372 fathoms. Station 200, Martinique, 472 fathoms. Station 208, Martinique, 213 fathoms. Station 221, St. Lucia, 423 fathoms. Station 226, St. Vincent, 424 fathoms. Station 227, St. Vincent, 573 fathoms. Station 228, St. Vincent, 785 fathoms. Station 230, St. Vincent, 464 fathoms. Station 239, Grenadines, 338 fathoms. Station 257, Grenada, 553 fathoms. Station 260, Grenada, 291 fathoms. Station 264, Grenada, 416 fathoms. Station 265, Grenada, 576 fathoms.

Ophioglypha irrorata? LVM.

The specimens seemed just the same as those from Station 164 of the "Challenger" (Bull. M. C. Z., V., No. 7, p. 74). They differed from those from the coast of Portugal, called *O. irrorata* (?) in the postscript to my Challenger Ophiuroidea (p. 381), in having three arm-spines set close together, whereas the latter had two below, and one separated and higher up; while farther out they were close together, and the middle one had the form of a blunt hook.

Station 140, Virgen Gorda, 1,097 fathoms. Station 245, Grenada, 1,058 fathoms.

Ophioglypha convexa? LVM.

Plate IV. Figs. 40-45.

Most of the specimens differ so much from *O. convexa* as to appear like another species. The six primary plates, extremely swollen, form an elevated rosette, overhanging very small radial shields, not so large as the head of the genital scale. The mouth-shield, too, occupies the *whole* of the lower interbrachial space (fig. 43). But specimens from Station 148 were intermediate, or rather differed from the typical form only in finer arm-comb papillæ and more interbrachial scales on the disk margin. It will be necessary to await further dredgings before deciding the specific limits. It is to be noted as an important difference, that, while the typical *O. convexa* is found in 2,350 fathoms, this species does not go below 240 fathoms.

Station 145, St Kitts, 270 fathoms. Station 157, Montserrat, 120 fathoms. Station 158, Montserrat, 148 fathoms. Station 220, St. Lucia, 116 fathoms. Station 224, St. Vincent, 114 fathoms.

Ophiocten Pattersoni sp. nov.

Plate IV. Figs. 46-48.

Special Marks. — Longest arm-spine as long as one and a half arm-joints. Disk covered above irregularly with larger and smaller scales. Arm-comb feeble. One wide mouth-papilla on each side, and two spiniform farther in, with one at apex of mouth-angle.

Description of an Individual. — Diameter of disk 9.5 mm. Width of arm close to disk 1.6 mm. A very wide papilla at outer corner of mouth-angle, and two spiniform within it, on either side, and one or two at the apex. Three slender, spike-like teeth. Mouth-shields rounded squarish, as broad as long, with an ill-marked angle within; length to breadth, 1.2:1.2. Side mouth-shields very narrow, of equal width, meeting fully within. First under arm-plate large, about as broad as long, of a rudely rhomboidal form, with a rounded angle outward; the rest are much wider than long, with a rounded angle without, a little peak within, and sharp lateral corners. Side arm-plates slightly flaring outward, meeting broadly below, where they cover most of the arm; separated above by the upper arm-plates, which are much broader than long, and a little wider without than within; length to breadth, .8:1.5. Disk circular and flat on top, where it is covered with fine, thin scales, among which appear numerous irregular plates, which form a continuous patch at the margin. Radial shields small, irregular, and widely separated. Interbrachial spaces below covered by a more regular imbricated scaling, and without plates. Genital scales hidden, except their outer ends, just outside the radial shields, which bear a feeble arm-comb of half a dozen or less minute papillæ. Tentacle-pores large; the outer ones are furnished with a small scale, which often is lacking on the basal pores. Three very slender, tapering arm-spines, the uppermost and longest one as long as one and a half or two joints. Color in alcohol, pale yellowish gray.

Station 344, Lat. 40° 1' N., Long. 70° 58' W., 129 fathoms, 1 specimen.

Ophiomusium eburneum LYM.

Bull. M. C. Z., I, 10, p. 322, 1869. Ill. Cat. M. C. Z., VI., Pl. II. figs. 1, 2, 3.

It happened strangely enough that the specimen originally described by me was only half grown and aberrant, differing from ordinary specimens somewhat in the comparative thinness of the disk scales, but chiefly in the narrowness of the arm, which was only 1.3 mm., while an average individual with a similar disk (9 mm.) would have an arm 2 mm. wide. I found, however, one or two whose arms were not much wider than those of the type.

This species attains a good size. One with a disk of 15 mm. had arms about 50 mm. long and 3 mm. wide. The radial shields were more elongated than in the type, and there were three little arm-spines.

In looking over a large series, there may be found some difference in the form of the radial shields, in the size and thickness of the fine central scales of the disk, in the length and number of the arm-spines, which may be two or three, and in the width of the arm.

Constant features are the somewhat swollen and microscopically tuberculous side arm-plates, the numerous and comparatively thin disk scales, and the presence of only *two* under arm-plates furnished with tentacles.

Station 100, off Morro Light, 250–400 fathoms. Station 132, Santa Cruz, 115 fathoms. Station 147, St. Kitts, 250 fathoms. Station 159, Guadeloupe, 196 fathoms. Station 176, Dominica, 390 fathoms. Station 177, Dominica, 118 fathoms. Station 185, Dominica, 333 fathoms. Station 208, Martinique, 213 fathoms. Station 215, St. Lucia, 226 fathoms. Station 218, St. Lucia, 164 fathoms. Station 231, St. Vincent, 95 fathoms. Station 238, Grenadines, 127 fathoms. Station 240, Grenadines, 164 fathoms. Station 241, Grenadines, 163 fathoms. Station 248, Grenada, 161 fathoms. Station 249, Grenada, 262 fathoms. Station 258, Grenada, 159 fathoms. Station 262, Grenada, 92 fathoms. Station 263, Grenada, 159 fathoms. Station 269, St. Vincent, 124 fathoms. Station 274, Barbados, 209 fathoms. Station 280, Barbados, 221 fathoms.

Ophiomusium Lymani WYV. ТНОМ.

Plate V. Figs. 55–57. (Young.)

The young, with a disk not larger than 5 mm., would be taken for a new species. On the back is an elevated rosette of thick primary plates, each having a central boss. Outside these lie the thick radial shields, and, in the interbrachial spaces, two plates, the marginal one much the larger. Below, it has, besides the genital scales, one large plate outside the mouth-shield, and two or three very small ones on the margin. With a disk of 8 mm. it resembles the adult of *O. validum*, of the same size, except that the latter has larger radial shields, fewer central scales, and, below, scarcely more than one great plate outside the mouth-shield.

Station 331, 35° 44' 40" N., 74° 40' 20" W., 898 fathoms.

The following were adult: —

Station 305, 41° 33' 15" N., 65° 51' 25" W., 810 fathoms. Station 307, 41° 29' 45" N., 65° 47' 10" W., 980 fathoms. Station 308, 41° 24' 45" N., 65° 35' 30" W., 1242 fathoms. Station 330, 31° 41' N., 74° 35' W., 1047 fathoms. Station 331, 35° 44' 40" N., 74° 40' 20" W., 898 fathoms. Station 338, 38° 18' 40" N., 73° 18' 10" W., 922 fathoms. Station 339, 38° 16' 45" N., 73° 10' 30" W., 1186 fathoms. Station 341, 39° 38' 20" N., 70° 56' W., 1241 fathoms. Station 342, 39° 43' N., 70° 55' 25" W., 1002 fathoms.

***Ophiomusium validum* Ljn.**

Station 100, off Morro Light, 250-400 fathoms. Station 101, off Morro Light, 175-200 fathoms. Station 117, Porto Rico, 874 fathoms. Station 131, Santa Cruz, 580 fathoms. Station 134, Santa Cruz, 248 fathoms. Station 145, St. Kitts, 270 fathoms. Station 146, St. Kitts, 245 fathoms. Station 148, St. Kitts, 208 fathoms. Station 149, St. Kitts, 60-180 fathoms. Station 161, Guadeloupe, 583 fathoms. Station 162, Guadeloupe, 734 fathoms. Station 163, Guadeloupe, 769 fathoms. Station 173, Guadeloupe, 734 fathoms. Station 174, Guadeloupe, 878 fathoms. Station 175, Dominique, 608 fathoms. Station 190, Dominique, 542 fathoms. Station 195, Martinique, 501 fathoms. Station 200, Martinique, 472 fathoms. Station 211, Martinique, 357 fathoms. Station 212, Martinique, 317 fathoms. Station 222, St. Lucia, 422 fathoms. Station 227, St. Vincent, 573 fathoms. Station 228, St. Vincent, 785 fathoms. Station 238, Grenadines, 127 fathoms. Station 257, Grenada, 553 fathoms. Station 259, Grenada, 159 fathoms. Station 261, Grenada, 340 fathoms. Station 264, Grenada, 416 fathoms. Station 291, Barbados, 200 fathoms. Bartlett, Station 4, 20° 24' 15" N., 73° 56' 50" W., 772 fathoms. Bartlett, Station 8, 17° 45' N., 77° 58' 40" W., 322 fathoms. Bartlett, Station 18, 18° 20' 30" N., 87° 16' 40" W., 600 fathoms.

***Ophiomusium testudo* Lym.**

Station 100, off Morro Light, 250-400 fathoms. Station 132, Frederickstadt, 115 fathoms. Station 136, Frederickstadt, 508 fathoms. Station 155, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 158, Montserrat, 148 fathoms. Station 177, Dominique, 118 fathoms. Station 178, Dominique, 130 fathoms. Station 224, St. Vincent, 114 fathoms. Station 232, St. Vincent, 88 fathoms. Station 262, Grenada, 92 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms. Station 290, Barbados, 73 fathoms. Bartlett, Station 29, 21° 23' 19" N., 82° 54' 42" W., 300 fathoms.

***Ophiomusium planum* Lym.**

Bartlett, Station 29, 21° 23' 19" N., 82° 54' 42" W., 300 fathoms.

***Ophiomusium acuferum* Lym.**

Station 132, Santa Cruz, 115 fathoms. Station 143, Saba Bank, 150 fathoms. Station 149, St. Kitts, 60-180 fathoms. Station 142, Flannegan Passage, 27 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 167, Guadeloupe, 175 fathoms. Station 177, Dominica, 118 fathoms. Station 196, Martinique, 1030 fathoms. Station 206, Marti-

nique, 170 fathoms. Station 210, Martinique, 191 fathoms. Station 220, St. Lucia, 116 fathoms. Station 224, St. Vincent, 114 fathoms. Station 231, St. Vincent, 95 fathoms. Station 233, St. Vincent, 174 fathoms. Station 253, Grenada, 92 fathoms. Station 254, Grenada, 164 fathoms. Station 262, Grenada, 92 fathoms. Station 269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 274, Barbados, 209 fathoms. Station 276, Barbados, 94 fathoms. Station 277, Barbados, 106 fathoms. Station 278, Barbados, 69 fathoms. Station 281, Barbados, 288 fathoms. Station 290, Barbados, 73 fathoms. Station 291, Barbados, 200 fathoms. Station 292, Barbados, 56 fathoms. Station 293, Barbados, 82 fathoms. Station 296, Barbados, 84 fathoms. Station 297, Barbados, 123 fathoms. Station 299, Barbados, 140 fathoms. Station 300, Barbados, 82 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms. Entrance to Port Royal, Jamaica, 100 fathoms.

Ophiomusium serratum LYM.

Station 136, Frederickstadt, 508 fathoms. Station 140, Virgen Gorda, 1097 fathoms. Station 205, Martinique, 334 fathoms. Station 211, Martinique, 357 fathoms. Station 214, Martinique, 476 fathoms. Station 230, St. Vincent, 464 fathoms. Station 260, Grenada, 291 fathoms. Station 269, St. Vincent, 124 fathoms. Station 274, Barbados, 209 fathoms. Station 280, Barbados, 221 fathoms. Station 288, Barbados, 399 fathoms. Bartlett, Station 8, $17^{\circ} 45'$ N., $77^{\circ} 58' 40''$ W., 322 fathoms. Bartlett, Station 24, 5 m. E. of Cape Cruz, S. side of Cuba, 206 fathoms.

Ophiomastus texturatus sp. nov.

Plate IV. Figs. 49-51.

Special Marks. — Three minute arm-spines. Disk covered above by a central rosette of eleven plates, from which radiate ten single lines of plates. Radial shields large and oblong.

Description of an Individual. — Diameter of disk 4.7 mm. Width of arm, near disk, 1.7 mm. A row of four or five small, block-like papillæ on each side of a mouth-angle; they are so closely wedged together as to form an apparently continuous line. Teeth resembling mouth-papillæ in form and size. Mouth-shields small, as broad as long, bounded by a curve without and an angle within; length to breadth, .7 : .7. Side mouth-shields pointed, oval, large, widely joined within. Under arm-plates small, occupying less than one third the width of the arm, five-sided, with outer edge curved, laterals reenteringly curved, and an angle within. Side arm-plates very large, meeting above and below, and covering the greater part of the broad arm. Upper arm-plates small, occupying little more than a third of the width of arm, trans-

verse oval. The surface of the arm, as well as that of the disk, is microscopically tuberculous. Disk covered above by swollen plates, of which there is a central rosette of eleven; one ten-sided in the midst, and surrounding it ten hexagonal, with unequal sides, whereof the brachial plates are the largest; all are continued, by single rows of small plates, to margin of disk. Below, the interbrachial space is occupied by large, thick genital plates, and by two others placed on the median line. Radial shields large, longer than broad, wider without than within, where they join the central rosette; length to breadth, 1.2 : .9. Genital openings narrow and very short, beginning at outer corner of radial shield. Three very small peg-like arm-spines, less than half as long as a joint. Second pair of mouth-tentacles issuing from pores just inside the side mouth-shields; first pair of arm-tentacles with three minute, lip-like scales; those beyond usually with only one small scale. Color in alcohol, pale gray.

"Challenger" Expedition, Station 173, 310 fathoms, 1 specimen.

Ophiomastus secundus LYM.

Station 136, Santa Cruz, 508 fathoms. Station 149, St. Kitts, 60-150 fathoms. Station 163, Guadeloupe, 769 fathoms. Station 179, Dominica, 824 fathoms. Station 180, Dominica, 982 fathoms. Station 182, Dominica, 1131 fathoms. Station 185, Dominica, 333 fathoms. Station 196, Martinique, 1030 fathoms. Station 205, Martinique, 334 fathoms. Station 211, Martinique, 357 fathoms. Station 230, St. Vincent, 464 fathoms. Station 288, Barbados, 399 fathoms. Station 325, 33° 35' 20" N., 76° W., 647 fathoms. Station 326, 33° 42' 15" N., 76° 0' 50" W., 464 fathoms. Station 329, 34° 39' 40" N., 75° 14' 40" W., 603 fathoms.

Ophiophyllum petilum? LYM.

Bull. M. C. Z., V. 7, p. 130, Pl. VII. Figs. 179-181.

Plate IV. Figs. 52-54.

The single specimen brought up from 542 fathoms at Station 190, near Dominica, differed from the type in having, near the base of the arm, a small, peg-like, additional arm-spine, standing just above the peculiar flat, curved, translucent spine, which seems like a continuation of the free plates which border the disk. Also there were not so many plates in the lower brachial space. All the disk plates were thin and more or less diaphanous, so that their outlines were hard to make out unless the specimen was partly dried. These differences may be constant and specific; but I prefer to leave them in doubt because only one adult specimen of the typical *O. petilum* was brought back by the "Challenger."

There is a certain resemblance in some parts of the Ophiuran fauna of the Fijis from depths of 200 to 600 fathoms to that of the West Indies at the

same depths. From the former we now have *Astroschema salix* and *horridum*, (?) *Ophioceramis clausa*, *Ophiactis cuspidata*, *O. flexuosa*, *O. nama*, *Amphiura canescens*, *A. argentea*, *A. bellis*, *Ophiomitra plicata*, *Ophiacantha cornuta*, *O. vepratrica*, *Ophiophyllum petilum*, *Ophiochiton lentus*, *Ophiomusium scalare*, *Ophioconis pulverulenta*, *Ophiopyrgus Wycille-Thomsoni*, *Ophiopyren brevispinus*, *Ophiozona insularia*, and *Ophiomyxa australis*. Of these *Ophiophyllum petilum*, *Ophiacantha vepratrica*, and *Ophioconis pulverulenta* correspond very closely with the *Ophiophyllum* above mentioned, with *Ophiacantha Bairdi*, and with *Ophioconis miliaria*. In both faunæ is found exclusively the peculiar genus *Ophiopyren*, and *Ophiozona* exists in both. *Ophiomusium scalare* and *Ophiomitra plicata* stand pretty near *Ophiomusium testudo* and *Ophiomitra chclys*. The genus *Astroschema*, so richly represented in the West Indies, has two species in this list of twenty. As a contrast comes the extraordinary form *Ophiopyrgus*, known thus far only from the neighborhood of the Fijis. It remains for future dredgings to show whether these resemblances result probably from community of origin, or simply indicate the presence of a nearly identical fauna over vast tracts of deep-sea bottom.

Ophiopyren longispinus LYM.

Station 130, Santa Cruz, 451 fathoms. Station 136, Santa Cruz, 508 fathoms. Station 137, Santa Cruz, 625 fathoms. Station 149, St. Kitts, 60-150 fathoms. Station 156, Montserrat, 88 fathoms. Station 185, Dominica, 333 fathoms. Station 188, Dominica, 372 fathoms. Station 190, Dominica, 542 fathoms. Station 204, Martinique, 476 fathoms. Station 205, Martinique, 334 fathoms. Station 211, Martinique, 357 fathoms. Station 212, Martinique, 317 fathoms. Station 221, St. Lucia, 423 fathoms. Station 222, St. Lucia, 422 fathoms. Station 230, St. Vincent, 464 fathoms. Station 246, Grenada, 154 fathoms. Station 260, Grenada, 291 fathoms. Bartlett, Station 18, 18° 20' 30" N., 87° 16' 40" W., 600 fathoms.

Ophioconis miliaria LYM.

Station 187, Dominica, 411 fathoms. Station 222, St. Lucia, 422 fathoms. Station 241, Grenadines, 163 fathoms. Station 260, Grenada, 291 fathoms.

Ophiochœta mixta LYM.

Station 170, Guadeloupe, 309 fathoms. Station 249, Grenada, 262 fathoms. Station 265, Grenada, 576 fathoms.

Ophiopholis aculeata GRAY.

Station 309, 40° 11' 40" N., 68° 22' W., 304 fathoms. Station 310, 39° 59' 16" N., 70° 18' 30" W., 260 fathoms. Station 335, 38° 22' 25" N., 73° 33' 40" W., 89 fathoms.

Ophiactis Mülleri (var. *quinqueradia*) LTK.

Station 142, Flannegan Passage, 27 fathoms. Station 152, St. Kitts, 122 fathoms. Station 210, Martinique, 121 fathoms. Station 239, Grenadines, 338 fathoms. Station 272, Barbados, 76 fathoms. Station 278, Barbados, 69 fathoms.

Amphiura incisa sp. nov.

Plate V. Figs. 58-60.

Special Marks. — Two scale-like papillæ on each side of mouth-angle, and a pair at its apex. Two large tentacle-scales. Upper disk-scales thick and irregular and separated by depressions.

Description of an Individual. — Diameter of disk 7.5 mm. Width of arm close to disk 1.7 mm. Two wide, scale-like papillæ at base of mouth-angle on either side, and a pair of thicker ones at its apex. Four stout squarish teeth; the lowest one smallest and more rounded than those above. Mouth-shields small, rounded, and with a peak inward; length to breadth, .7 : .7. Side mouth-shields long and large; broader without than within, where they meet. First under arm-plate small and rounded; often partly covered by the outer mouth-papillæ. The plates beyond are of a regular narrow shield-shape, having a straight outer side where they are widest; re-enteringly curved laterals, and an angle within. Side arm-plates flat, with a low spine-ridge, barely meeting above, and scarcely separated below. Upper arm-plates separated; narrow transverse oval, more than twice as broad as long. Disk rather thick, with an undulating border; covered above by thick, irregular, somewhat angular scales, which are separated by sunken lines, and have the look of a loose mosaic. Below, the scales are smaller and much more rounded and regular, but are strongly separated. Radial shields small, pear-seed shape, and separated by a narrow wedge of three scales; length to breadth, 1.5 : 1. Three stout, blunt, rounded arm-spines, about as long as a joint; the middle one is stoutest and has a microscopically rough surface. Two wide, large tentacle-scales, standing one on the side and one on the under arm-plate. Color in alcohol, pale brown.

Station 161, near Guadeloupe, 583 fathoms, 2 specimens.

This species is nearest *A. Rüsei*, from which it is strongly distinguished by separated upper arm-plates and radial shields, and much coarser arm-spines and disk-scales.

Amphiura nereis sp. nov.

Plate V. Figs. 61-63.

Special Marks. — Five papillæ on each side of a mouth-angle. Three arm-spines. Radial shields small, narrow and separated. A row of minute papillæ along genital scale.

Description of an Individual. — Diameter of disk 4.5 mm. Width of arm without spines 1 mm. Four small scale-like mouth-papillæ on each side of an angle, and a pair at the apex. The papilla next the outermost one is commonly the largest. Mouth-shields about as broad as long, rounded, with a slight peak within; length to breadth, .6 : .6. Side mouth-shields small, and extremely narrow within, where they barely meet. Their outer ends are club-shaped. First under arm-plate minute and three-cornered; those beyond are of a squarish shield-shape, with outer side straight, laterals a little re-enteringly curved, and an obtuse or truncated angle within. Side arm-plates moderately stout, and nearly meeting above and below. Upper arm-plates transverse oval, and about twice as broad as long. Disk rather thick, and covered above and below with small, crowded, overlapping, somewhat irregular scales, of which there are seven or eight in the length of 1 mm. In centre of upper surface are the small, round, widely separated primary plates. Along edge of genital scale is a row of fine papillæ. Radial shields small, narrow, and separated by bunches of scales; their length is about .8 mm. Three rather stout, rounded, tapering arm-spines, about as long as a joint; the middle one being somewhat the longest. One oval tentacle-scale on the side arm-plate, and a smaller and narrower one on the under plate. Color in alcohol, pale gray.

Station 158, Montserrat, 148 fathoms, 1 specimen.

This species is perhaps nearest to *A. tumida*, from which it differs in having much larger mouth-papillæ, and a row of papillæ along the genital scale.

Amphiura duplicata Lym.

Station 132, Santa Cruz, 115 fathoms. Station 134, Santa Cruz, 248 fathoms. Station 136, Santa Cruz, 508 fathoms. Station 145, St. Kitts, 270 fathoms. Station 147, St. Kitts, 250 fathoms. Station 148, St. Kitts, 208 fathoms. Station 151, Nevis, 356 fathoms. Station 154, Montserrat, 298 fathoms. Station 155, Montserrat, 88 fathoms. Station 161, Guadeloupe, 583 fathoms. Station 167, Guadeloupe, 175 fathoms. Station 173, Guadeloupe, 734 fathoms. Station 176, Dominica, 390 fathoms. Station 185, Dominica, 333 fathoms. Station 204, Martinique, 476 fathoms. Station 206, Martinique, 170 fathoms. Station 210, Martinique, 191 fathoms. Station 216, St. Lucia, 154 fathoms. Station 218, St. Lucia, 164 fathoms. Station 220, St. Lucia, 116 fathoms. Station 221, St. Lucia, 423 fathoms. Station 227, St. Vincent, 573 fathoms. Station 238, Grenadines, 127 fathoms. Station 239, Grenadines, 338 fathoms. Station 241, Grenadines, 163 fathoms. Station 260, Grenada, 291 fathoms. Station 261, Grenada, 340 fathoms. Station 264, Grenada, 416 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 274, Barbados, 209 fathoms. Station 275, Barbados, 218 fathoms. Station 276, Barbados, 94 fathoms. Station 290, Barbados, 73 fathoms.

***Amphiura Otteri* L_{JN}.**

Station 115, 17° 55' N., 76° 41' 20" W., 228 fathoms. Station 167, Guadeloupe, 175 fathoms. Station 265, Grenada, 576 fathoms. Station 306, 41° 32' 50" N., 65° 55' W., 524 fathoms. Station 310, 39° 59' 16" N., 70° 18' 30" W., 260 fathoms. Station 336, 38° 21' 50" N., 73° 32' W., 197 fathoms.

***Amphiura tumida* L_{YM}.**

Station 184, Dominica, 94 fathoms.

***Amphiura tenuispina* L_{JN}.**

Station 215, St. Lucia, 226 fathoms. Station 223, St. Vincent, 146 fathoms. Station 246, Grenada, 154 fathoms.

***Amphiura lunaris* L_{YM}.**

Station 226, St. Vincent, 424 fathoms.

***Amphiura grandisquama* L_{YM}.**

Station 316, 32° 7' N., 78° 37' 30" W., 229 fathoms. Station 319, 32° 25' N., 77° 42' 30" W., 262 fathoms.

***Amphiura flexuosa?* L_{JN}.**

Station 319, 32° 25' N., 77° 42' 30" W., 262 fathoms.

***Amphiura cuneata* L_{YM}.**

Station 256, Grenada, 370 fathoms. Station 259, Grenada, 159 fathoms.

***Amphiura Stimpsoni* L_{TK}.**

Station 278, Barbados, 69 fathoms.

NOTES ON AMPHIURA.

***Amphiura* sp. nov.?**

Near *A. semierrmis*, but has disk-scales much larger and fewer, and two large tentacle-scales. There are five short, tapering equal arm-spines. The lower interbrachial space is naked, except a few scales near the mouth-shields.

Station 244, near Grenada, 792 fathoms, 1 specimen.

***Amphiura* sp. nov.?**

Near *A. divaricata*, from which it differs in having radial shields scarcely separated, in coarser lower disk-scales, in having a larger tentacle-scale on the

under arm-plate, and in having five (not six) arm-spines, of which the lower are larger, and have a rudimentary cross-piece at the tip.

Station 211, Martinique, 357 fathoms, 1 specimen.

Amphiura sp. nov. ?

Plate V. Figs. 64-66.

Similar to preceding (Station 211), but with much smaller tentacle-scales; sharp mouth-papillæ.

Station 220, St Lucia, 116 fathoms, 1 specimen.

These last three species may be new; but as the *Amphiuræ* are so numerous and run so close, I prefer to await a larger series of specimens.

Amphiura Verrilli? (young.) LYM.

Differs from the type in having smaller radial shields and the primary disk-plates not conspicuous.

Station 226, St. Vincent, 424 fathoms, 1 specimen.

Amphiura tomentosa? (young.) LYM.

Differs from the original in having the radial shields touching and side arm-plates meeting above. These may be characters of the young.

Station 230, St. Vincent, 464 fathoms, 1 specimen.

Amphiura angularis LYM.

It seems to differ from the type only in having radial shields a little closer and the disk-scaling less marked. Both *A. angularis* and *A. tomentosa* are from the Kerguelen Islands.

Station 204, Martinique, 476 fathoms, 1 specimen. Station 288, Barbados, 399 fathoms, 1 specimen.

Ophiocnida olivacea LYM.

Station 344, 40° 1' N., 70° 58' W., 129 fathoms.

Ophonema intricata LTK.

(Young.) Station 128, Santa Cruz, 180 fathoms.

Ophonereis reticulata LTK.

Station 142, Flannegan Passage, 27 fathoms. Station 155, Montserrat, 88 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms. Bartlett, Pedro Bank, 4 fathoms.

Ophiopsila fulva LYM.

Station 155, Montserrat, 88 fathoms. Station 278, Barbados, 69 fathoms.

Ophiopsila Riisei LTK.

Station 285, Barbados, 13-40 fathoms. Station 287, Barbados, $7\frac{1}{2}$ -50 fathoms.

Ophioplax Ljungmani LYM.

Station 101, Morro Light, 175-250 fathoms. Station 132, Santa Cruz, 115 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 177, Dominique, 118 fathoms. Station 220, St. Lucia, 116 fathoms. Station 232, St. Vincent, 88 fathoms. Station 273, Barbados, 103 fathoms. Station 277, Barbados, 106 fathoms. Station 297, Barbados, 123 fathoms. Bartlett, Station 10, $18^{\circ} 13' 20''$ N., $78^{\circ} 36' 40''$ W., 103 fathoms.

Ophiostigma isacanthum LYM.

Station 132, Santa Cruz, 115 fathoms. Station 152, St. Kitts, 122 fathoms.

Ophiochytra tenuis sp. nov.**Plate III. Figs. 16-18.**

Special Marks. — Two very large scale-like papillæ at outer end of mouth-angle, and two small ones, within and higher in the slit. A few grains in neighborhood of mouth-shield.

Description of an Individual. — Diameter of disk 5 mm. Width of arm near disk 1 mm. At outer end of mouth-angle on either side are two large, flat, rounded scale-like papillæ, while within and higher on the mouth-frame may be seen two which are minute. At base of mouth-frames, in the centre, is a group of half a dozen grains, covering inner ends of the side mouth-shields, which are long, narrow and bent; wider without than within where they fully join and extend as a sharp angle under the mouth-frames to a level with the second great mouth-papilla. Mouth-shields small, about as long as broad, with a well-marked angle inward; length to breadth, .5 : .6. First under arm-plate smaller than those beyond, and making a furrow at outer corner of mouth-slit. The plates just beyond are axe-shaped with a curve without, an angle within, and deep re-entering curves where the tentacles protrude. Side arm-plates meeting above and nearly so below; beyond the disk they are a little swollen so as to give a slightly wavy outline to the arm. Upper arm-plates fan-shaped, with an angle inward. Disk evenly covered with thin

imbricated scales, whereof the lower ones are nearly as large as the mouth-shields, near which are a few grains. Radial shields small and not touching; nearly twice as wide as long, and separated from upper surface of arm by a cluster of scales. Genital openings extending from mouth-shield to margin of disk. Two stout, cylindrical, blunt arm-spines, about two thirds as long as a joint. One large circular tentacle-scale. Color in alcohol, pale gray.

Station 239, Grenadines, 383 fathoms, 6 specimens. Station 260, Grenada, 291 fathoms, 5 specimens.

The only other species of this genus, *O. epigrus*, comes from Low Archipelago, southeast of the Sandwich Islands, at a depth of over 2500 fathoms.

Ophiocoma pumilla LTK.

Bartlett, Pedro Bank, 4 fathoms.

Ophiochiton ternispinus sp. nov.

Plate V. Figs. 67-69.

Special Marks. — One tentacle-scale. Three slender, rather long arm-spines.

Description of an Individual. — Diameter of disk 12 mm. Length of arm 60 mm. Width of arm near disk 2 mm. Twelve mouth-papillæ to each angle, whereof the four inner ones, on either side, are short, pointed and spaced, while the two outer ones are flattened and crowded. Teeth stout, flat, and shaped like a blunt spear-head. Mouth-shields regular pointed heart-shaped, with a small rounded lobe without. Length to breadth, 2 : 1.3. Side mouth-shields very narrow within, where they barely meet; but spreading widely without, where they bound a part of the inner end of the genital opening. First under arm-plate rounded and small, not larger than the neighboring mouth-papilla. The plates beyond are much narrower than the arm; they are about as broad as long, much wider without than within, with an outer curve, re-entering curves on the sides, and a truncated angle within. They are somewhat swollen, but have no ridge. Side arm-plates even, slightly flaring, nearly meeting above and below. Upper arm-plates narrower than the arm, much longer than wide, bounded on all sides by gentle curves. Disk covered with thin, irregular, overlapping scales, and having in the centre a group of much larger rounded primary plates, 1 mm. in diameter. Below, the scaling is similar but finer. Radial shields narrow oblong, or egg-shape, small, separated by a narrow wedge of fine scales; length to breadth, 2 : 1. Genital openings large and long, extending from mouth-shield to margin of disk. Three smooth, slender, tapering arm-spines, whereof the uppermost may be as long as two joints. Lengths, to that of an under arm-plate, 2.5, 1.2, 1.2 : 1. One oval tentacle-scale of moderate size. Color in alcohol, nearly white.

“Porcupine” Expedition, 1869, Station 42, southwest of Ireland, 862 fathoms, water 4°3 Cent., 1 specimen.

The genus is new to North European waters. The species differs from *Ophiochiton lentus*, which comes from 600 fathoms, southeast of the Fijis, in having three long slender arm-spines and only one tentacle-scale.

Ophiacantha Bairdi sp. nov.

Plate V. Figs. 70-72.

Special Marks. — Disk closely and uniformly beset with elongated pointed granules, among which appear a few short scattered spines. Seven or eight slender, smooth, sharp arm-spines. Eleven mouth-papillæ to each angle.

Description of an Individual (Station 340). — Diameter of disk 9.5 mm. Length of arm about 45 mm. Width of arm close to disk 2 mm. Eleven papillæ to each mouth-angle, whereof the outer one on each side is broad and flat, with a rounded cutting edge, and the rest are much narrower and tooth-like, including the odd one at the apex. Five broad flat teeth with a curved cutting edge; the uppermost one narrower than the others. Mouth-shields small, of a broad oval, or transverse heart-shape; length to breadth, .8 : 1.2. Side mouth-shields rather large, growing suddenly wider at the outer end, meeting within. Under arm-plates pentagonal, with an obtuse angle within, lateral sides a little re-enteringly curved, and outer side widely curved. Upper arm-plates diamond-shape with the angles much rounded. Side arm-plates rather stout, nearly meeting above and below near base of arm. Near tip of arm the side plates meet broadly above and below, and have only a feeble spine-crest. The upper arm-plates are there three-sided with an angle inward. Disk slightly puffed; closely and uniformly beset with elongated, pointed grains, among which stand a few scattered short spines. No scaling or radial shields visible. Seven or eight long, slender, pointed, not rough arm-spines. The uppermost one is usually short; then the next three are as long as two or two and a half joints; the four lowest not much longer than one joint. One large, pointed, longer than broad tentacle-scale. Color in alcohol, nearly white.

Station 308, 41° 24' 45" N., 65° 35' 30" W., 1242 fathoms. Station 340, 39° 25' 30" N., 70° 58' 40" W., 1394 fathoms.

The species is quite near *O. vepraticea*, from which it is distinguished by having eleven instead of seven mouth-papillæ to each angle, and by the elongated, pointed grains of the disk.

Ophiacantha Bartletti sp. nov.

Plate V. Figs. 73-75.

Special Marks. — Structure delicate, with narrow arms and four smooth, slender arm-spines. A few scattered spines on disk, whose scaling above is scarcely distinguishable. No tentacle-scales.

Description of an Individual. — Diameter of disk 12 mm. Length of arm about 75 mm. Width of arm 2 mm. Five spine-like, spaced mouth-papillæ

on each side, of which four stand on the mouth-frames, and one on the side mouth-shield; there is in addition a pair which stand at the apex; on the jaw-plate. Five rather thin teeth, shaped like a blunt spear-head. Mouth-shields about as broad as long, of a much-rounded diamond-shape, with a sharp angle within; length to breadth, 1.6 : 1.6. Side mouth-shields very narrow within, where they meet, but spreading at their outer end, so as to partly embrace the mouth-shield. Under arm-plates somewhat longer than broad, of an irregular hexagonal form, with a slight notch without; they are small, and occupy not more than a third of the width of the arm. Side arm-plates meeting above and below, clinging close to arm and with a feeble spine-crest. Upper arm-plates about twice as broad as long, of a transverse diamond-shape, with outer angle rounded. Disk sparsely set with short spines, and covered by a skin which hides the thin scales, except here and there. Of radial shields only the outer, rounded ends may be seen, just over the arms. Genital openings large and extending from mouth-shield nearly to margin of disk. Four slender, smooth, tapering, translucent arm-spines, decreasing in length from above downward, the uppermost one being as long as two joints, while the lowest does not exceed one. No tentacle-scales. Color in alcohol, disk pale gray, arms white.

Station 260, 291 fathoms, 1 specimen.

In wanting tentacle-scales this species is especially distinguished. It stands as near to *O. abnormis* as to any other, but differs in having only four arm-spines and in the arrangement of the mouth-papillæ.

Ophiacantha cervicornis sp. nov.

Plate V. Figs. 76-78.

Special Marks. — Mouth-angles elongated and carrying at their base long spiniform papillæ and small peg-like ones at their apex. Arm-spines wide at their base and toothed on the edges. Disk densely beset with short smooth spines.

Description of an Individual (Station 227). — Diameter of disk 10 mm. Width of arm near disk 2.3 mm. Mouth-angle much elongated and bearing on either side, at its base, four long, pointed spiniform papillæ, inside which there are, on either side, five short, pointed tooth-like papillæ, and a pair at the apex. Mouth-shields of a transverse oval shape, with a small peak inward; length to breadth, 1 : 1.8. Side mouth-shields of moderate width, meeting within, where they form an acute angle. First under arm-plate much wider than long, with lateral corners rounded and a peak within. The plates beyond have a wide axe-shape, in which the body is narrow with an obtuse angle inward; the lateral sides are deep re-entering curves, and the cutting edge is represented by the broad, curved outer margin. Side arm-plates meeting below and nearly so above, and having a rather feeble spine-crest. The first two upper arm-plates bear a few small tooth-like spines, and are as broad

as long, and bounded without by a gentle curve and within by a deep pointed one. Farther out the plates are more elongated and angular, and soon become long diamond-shape. Disk densely beset with short, rounded, pointed spines, which obscure the underlying scales and radial shields. Five flattened, tapering, pointed arm-spines, the two uppermost about as long as one and a half arm-joints, the three lowest somewhat shorter. They are lightly swollen at their base and bear a few minute thorns on their edges. Tentacle-pores large, and furnished with two long, slender spiniform scales, whereof one stands on the side arm-plate, the other on the under one. Color in alcohol, straw.

Station 148, St. Kitts, 208 fathoms. Station 227, St. Vincent, 573 fathoms.

The elongated mouth-angle bearing numerous papillæ places this species near *O. stimulea* and *O. hirsuta*, but it differs much from both those species, especially in the under arm-plates and tentacle-scales.

Ophiacantha lineolata sp. nov.

Plate VI. Figs. 79-81.

Special Marks. — A group of tooth-papillæ just under the teeth. Upper surface of disk wholly and thickly set with coarse grains and a few short spines. Eight or nine long, translucent, nearly smooth arm-spines.

Description of an Individual. — Diameter of disk 18 mm. Length of arm about 135 mm. Width of arm, without spines, 6 mm. At base of mouth-angle, on either side, are three or four rather long papillæ, whereof the two outer ones are wider and more flat; the point of the angle is beset by a cluster of a dozen spine-like papillæ which run upward to join the teeth. These last are seven or eight in number, rather narrow, crowded and with a curved cutting edge. Mouth-shields heart-shaped with an angle inward; length to breadth, 2 : 2. Side mouth-shields small, tapering to a point inward, where they meet. Under arm-plates squarish, wider than long, with lateral sides re-enteringly curved and a feeble angle within. Side arm-plates meeting below, but not above, and forming a stout, not very prominent spine-crest. Upper arm-plates narrow, four-sided; wider without than within; length to breadth, 1.3 : 1.3. Disk somewhat swollen in interbrachial spaces, thickly set with coarse grains, among which appear a few small spines; no radial shields visible, their position being granulated like the rest. Genital openings large and extending from mouth-shield to margin of disk. Eight or nine long translucent, nearly smooth arm-spines, decreasing in length from above downward; their cross-section is oval, and it is only on their edges that they have microscopic prickles; length of uppermost spine 11 mm.; of lowest, 4 mm. One large, oval, pointed tentacle-scale on each pore, except the first, which has two. Color in alcohol, pale brown, with white spines and a white line along upper side of arm.

This large and beautiful species has some relation to *Ophiocamax* in the cluster of tooth-papillæ at the end of the mouth-angle.

Station 148, St. Kitts, 208 fathoms, 1 specimen.

Ophiacantha lævipellis sp. nov.

Plate VI. Figs. 82-84.

Special Marks. — Disk naked, or with a few scattered grains. Side arm-plates meeting above and below. Seven or eight slightly thorny slender arm-spines.

Description of an Individual. — Diameter of disk 4.5 mm. Length of arm about 18 mm. Width of arm, without spines, 1.5 mm. Mouth-angles long and wide, and bearing on each side three spine-like, widely spaced papillæ, while the apex is occupied by the lowest tooth, which, like the four above it, is of a blunt spear-head shape. The first under arm-plate also carries on its inner edge two scale-like papillæ. Mouth-shields small, of a tranverse diamond-form with rounded corners; length to breadth, .7 : .5. Side mouth-shields wide and large, of almost a crescent shape, meeting broadly within. First under arm-plate rounded hexagonal and nearly as large as a mouth-shield; those beyond are widely separated by the side arm-plates, and are more than twice as wide as long, with a curve without and a small peak within. Side arm-plates meeting widely above and below, and forming a strong spine-ridge, which, farther out, becomes so exaggerated as to give the arm a knotted look. Upper arm-plates, beyond the first, of a blunt wedge form, with the point inward. Disk covered with small imbricated scales which are quite naked (in some specimens there are scattered grains). Radial shields pear-seed shaped; length to breadth, .5 : .4. Genital openings large, and extending from the mouth-shield to nearly the margin of disk. Seven or eight glassy, flattened, slightly thorny arm-spines, of which the uppermost is two or two and a half times as long as a joint; from this they grow shorter to the lowest spine, which is no longer than one joint. The uppermost spines on top of arm stand close to each other, on either side of the median line. One small, pointed tentacle-scale. Color in alcohol, pale brown.

Station 232, St. Vincent, 88 fathoms, 12+ specimens.

The figure of the upper surface is drawn from specimens of two varieties, a smooth and a granulated. The former is the more common. This species has some resemblance to *O. serrata*, but has narrower side mouth-shields and much less thorny arm-spines.

Ophiacantha scolopendrica sp. nov.

Plate VI. Figs. 85-87.

Special Marks. — Seven smooth arm-spines, of which the three lowest are much the smallest. Disk with a few scattered smooth grains, and small rounded radial shields.

Description of an Individual.—Diameter of disk 12 mm. Width of arm 3 mm. Six spaced and rather long mouth-papillæ to each angle. Five thick teeth, of a short oval shape. Mouth-shields very short and wide, rudely transverse oval in form; length to breadth, 1 : 2.5. Side mouth-shields much longer than wide, of nearly equal width except at their outer ends where they taper; they fully meet within. First under arm-plate of a transverse diamond-shape with rounded angles; the next two are squarish, with a curved outer side; those beyond are nearly semicircular, with a slight peak within; all are narrow, occupying not more than one third the width of the arm. Side arm-plates stout and forming a well-marked spine-ridge; they meet below and separate all except the first two upper arm-plates; they, however, do not meet, and there is a pit between their upper ends; also they are so short as to leave a band on sides of arm quite uncovered. Upper arm-plates transverse oval with somewhat pointed corners; they are nearly twice as broad as long and cover only about half the width of the arm. Disk-scales very indistinct, except near radial shields, which are separated, small, short and rounded; length to breadth, 1.3 : 2. Upper surface of disk sparsely set with smooth grains. Lower interbrachial space smooth and apparently with few or no scales. Genital openings large and extending from the mouth-shield to margin of disk. Seven arm-spines, of which the three lowest are very small, microscopically rough, and not longer than half a joint; while the three uppermost are often as long as one and a half or two joints, stout, nearly cylindrical, and tapering to a blunt point. On some of the basal pores there is a minute tentacle-scale attached at the juncture of under and side arm-plates. Color in alcohol, pale brown.

“Challenger” Expedition, Station 235, 34° 7' N., 138° E., 565 fathoms. Water 3°.3 Cent. Mud. One specimen.

The species is nearest *O. tuberculosa*; but has seven instead of three arm-spines.

Ophiacantha anomala? G. O. Sars.

Station 306, 41° 32' 50" N., 65° 55' W., 524 fathoms.

Ophiacantha bidentata Ljn.

Station 307, 41° 29' 45" N., 65° 47' 10" W., 980 fathoms. Station 308, 41° 24' 45" N., 65° 35' 30" W., 1242 fathoms. Station 324, 33° 27' 20" N., 75° 53' 30" W., 1386 fathoms. Station 338, 38° 18' 40" N., 73° 18' 10" W., 922 fathoms. Station 339, 38° 16' 45" N., 73° 10' 30" W., 1186 fathoms. Station 340, 39° 25' 30" N., 70° 58' 40" W., 1394 fathoms. Station 341, 39° 38' 20" N., 70° 56' W., 1241 fathoms. Station 342, 39° 43' N., 70° 55' 25" W., 1002 fathoms.

Ophiacantha abyssicola G. O. Sars.

Station 309, 40° 11' 40" N., 68° 22' W., 304 fathoms.

***Ophiacantha millespina* VLL.**

Station 303, 41° 34' 30" N., 65° 54' 30" W., 306 fathoms. Station 306, 41° 32' 50" N., 65° 55' W., 524 fathoms.

***Ophiacantha hirsuta* LYM.**

Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 212, Martinique, 317 fathoms. Station 215, St. Lucia, 226 fathoms. Station 223, St. Vincent, 146 fathoms. Station 232, St. Vincent, 88 fathoms. Station 268, Grenada, 955 fathoms. Station 269, St. Vincent, 124 fathoms. Station 273, Barbados, 103 fathoms. Station 293, Barbados, 82 fathoms. Station 300, Barbados, 82 fathoms. Entrance to Port Royal Harbor, Jamaica, 100 fathoms ; sp. ?

***Ophiacantha sertata* LYM.**

Station 148, St. Kitts, 208 fathoms. Station 164, Guadeloupe, 150 fathoms. Station 187, Dominica, 411 fathoms. Station 208, Martinique, 213 fathoms. Station 240, Grenadines, 164 fathoms. Station 241, Grenadines, 163 fathoms. Station 249, Grenada, 262 fathoms. Station 274, Barbados, 209 fathoms. Station 280, Barbados, 221 fathoms. Station 291, Barbados, 200 fathoms. Station 297, Barbados, 123 fathoms.

***Ophiacantha vepratrica* LYM.**

Station 151, Nevis, 356 fathoms. Station 204, Martinique, 476 fathoms. Station 205, Martinique, 334 fathoms. Station 226, St. Vincent, 424 fathoms. Station 260, Grenada, 291 fathoms. Station 264, Grenada, 416 fathoms. Station 288, Barbados, 399 fathoms.

NOTES ON OPHIACANTHA.

***Ophiacantha scutata* LYM.**

The numerous individuals brought back by the second "Blake" expedition show some variations from the original figure (Bull. M. C. Z., V. 9, Pl. I. Figs. 1-3). Usually the radial shields are not naked, but beset, like the rest of the disk, with minute stumps. There often is an extra mouth-papilla on each side ; and higher up in the mouth-slit there may be a pair of scales belonging to the second mouth-tentacles. This last feature exists also in *O. cosmica*, a kindred species, but readily distinguished by the wide separation of the lower arm-plates. *O. scutata* has commonly only one tentacle-scale on the first pore, as on those beyond.

Station 134, Santa Cruz, 248 fathoms. Station 147, St. Kitts, 250 fathoms.

Station 148, St. Kitts, 208 fathoms. Station 183, Dominica, 250 fathoms. Station 238, Grenadines, 127 fathoms. Station 239, Grenadines, 338 fathoms. Station 269, St. Vincent, 124 fathoms. Station 281, Barbados, 288 fathoms. Station 291, Barbados, 200 fathoms.

Ophiacantha echinulata LYM.

Sometimes the radial shields cannot be seen, as in the figure (Bull. M. C. Z., V. 9, Pl. I. Figs. 7-9), but are quite hidden by the short disk-spines.

Station 153, Montserrat, 303 fathoms. Station 174, Guadeloupe, 878 fathoms. Station 185, Dominica, 333 fathoms. Station 205, Martinique, 334 fathoms. Station 227, St. Vincent, 573 fathoms. Station 260, Grenada, 291 fathoms.

Ophiacantha pentacrinus LTK.

A large specimen with a disk of 6 mm. had still only six arm-spines, and in general answered to the description (*O. meridionalis*, Bull. M. C. Z., I. 10, p. 324), except that there were sometimes four, instead of three, mouth-papillae on a side, and the disk-crotchets were somewhat stouter.

Station 136, Santa Cruz, 508 fathoms. Station 137, Santa Cruz, 625 fathoms. Station 155, Montserrat, 88 fathoms. Station 167, Guadeloupe, 175 fathoms. Station 176, Dominica, 390 fathoms. Station 185, Dominica, 333 fathoms. Station 188, Dominica, 372 fathoms. Station 195, Martinique, 502½ fathoms. Station 204, Martinique, 476 fathoms. Station 205, Martinique, 334 fathoms. Station 206, Martinique, 170 fathoms. Station 211, Martinique, 357 fathoms. Station 212, Martinique, 317 fathoms. Station 221, St. Lucia, 423 fathoms. Station 222, St. Lucia, 422 fathoms. Station 226, St. Vincent, 424 fathoms. Station 227, St. Vincent, 573 fathoms. Station 230, St. Vincent, 464 fathoms. Station 260, Grenada, 291 fathoms. Station 280, Barbados, 221 fathoms. Station 288, Barbados, 399 fathoms. Station 291, Barbados, 200 fathoms. Station 299, Barbados, 140 fathoms. Station 320, 32° 33' 15" N., 77° 30' 10" W., 257 fathoms.

O. cosmica is near this species, but has seldom less than eight arm-spines, while the disk-crotchets are coarser with a crown of more numerous thorns, and the side arm-plates are less prominent.

Ophiacantha stellata LYM.

This species differs from the two last-named in having shorter and more thorny arm-spines (indeed, the upper arm-spines, beyond the basal joints, are often scarcely longer than the lower); in larger upper arm-plates, and more strongly knotted arms; and in coarser and more thorny stumps on the disk.

Station 155, Montserrat, 88 fathoms. Station 177, Dominica, 118 fathoms. Station 233, St. Vincent, 174 fathoms. Station 249, Grenada, 262 fathoms. Station 253, Grenada, 92 fathoms. Station 262, Grenada, 92 fathoms. Station

269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 290, Barbados, 73 fathoms. Station 292, Barbados, 56 fathoms. Station 293, Barbados, 82 fathoms.

Ophiacantha aspera LYM.

Station 100, off Morro Light, 250–400 fathoms. Station 156, Montserrat, 88 fathoms. Station 158, Montserrat, 148 fathoms. Station 166, Guadeloupe, 150 fathoms. Station 171, Guadeloupe, 183 fathoms. Station 219, St. Lucia, 151 fathoms. Station 240, Grenadines, 164 fathoms. Station 241, Grenadines, 163 fathoms. Station 249, Grenada, 262 fathoms. Station 269, St. Vincent, 124 fathoms. Station 283, Barbados, 237 fathoms. Station 290, Barbados, 73 fathoms.

Ophiacantha Troscheli LYM.

Station 269, St. Vincent, 124 fathoms. Station 290, Barbados, 73 fathoms.

Ophiolebes claviger? LYM.

Station 306, 41° 32' 50" N., 65° 55' W., 524 fathoms.

Ophiomitra incisa sp. nov.

Plate VI. Figs. 89, 96.

Special Marks.—Upper interbrachial spaces indented and covered by a double row of large plates. Radial shields large, scarcely depressed, and nearly or quite joined for their whole length. Two or more tentacle-scales on the first pore. Five slightly thorny arm-spines.

Description of an Individual (Station 131).—Diameter of disk 10 mm. Length of arm about 80 mm. Width of arm 3.5 mm. Four or five papillæ on each side of a mouth-angle; the three inner ones being stout spiniform, while the outermost, which is wedged between the side mouth-shield and first under arm-plate, is thick, flattened and more or less curled upward. Mouth-shields of a transverse diamond-shape, with corners so rounded as often to approach an oval; length to breadth, 1.8 : 1.2. They are thick and horizontal, so that their border stands out quite sharply from the nearly vertical scaling of the interbrachial space. Side mouth-shields wide and short, not extending beyond the lateral corners of the mouth-shields, widest within, where they fully join. First under arm-plate small, of a diamond-shape with a curve without. The rest are five-sided; widest without, where they are curved, and having re-entering laterals and a very feeble angle within. They are separated by a depressed portion of the side arm-plates, which meet below, but not above, near disk, and form prominent spine-crests on the sides of the arms. Upper arm-plates thick, wider than long, bounded by a gentle curve

without, and by a rounded angle or a deep curve within. Disk thick and rising well above the arms, with a very deep constriction and radiating furrow in each interbrachial space. The surface between the furrow and the radial shield is occupied on either side by four large curved plates running diagonally inwards. The central disk is covered by coarse, irregular plates, similar to those of the lower interbrachial spaces. All the upper surface except the radial shields is sparsely set with smooth stumps. Radial shields large and only a little sunken; joined, except at their inner ends, which are separated by a scale; they are rounded without, pointed within; length to breadth, 3.5 : 1.4. Genital openings reaching from the mouth-shield nearly to margin of disk. Five flattened glassy arm-spines which are slightly thorny on their edges; the upper one is much the longest, and may equal three or four joints, thence they decrease to the lowest, which is about the length of a joint. On the first tentacle-pore are three erect, thickened tentacle-scales; on the other pores there is but a single thickened scale. Color in alcohol, pale straw.

Variations. — There sometimes are as many as six scales on the first tentacle-pore; and a small group of papillæ at outer corner of mouth-slit. The greatest number of arm-spines observed was six. It differs from *O. chelys* in having larger radial shields, which are joined and scarcely sunken (not at all in the young), in having three or more scales on the first tentacle-pore, and in more rounded under arm-plates. Most of the specimens mentioned under *O. chelys* (Bull. Mus. Comp. Zool., V. 7, p. 153, and 9, p. 231), as brought by the first "Blake" expedition, belong under this species, although one of them had seven spines. I am satisfied that the deep furrows in the disk are natural to the animal, and are not the result of contraction.

Station 124, Santa Cruz, 580 fathoms. Station 131, Santa Cruz, 580 fathoms. Station 175, Dominica, 608 fathoms. Station 190, Dominica, 542 fathoms. Station 204, Martinique, 476 fathoms. Station 205, Martinique, 334 fathoms. Station 211, Martinique, 357 fathoms. Station 214, Martinique, 476 fathoms. Station 222, St. Lucia, 422 fathoms. Station 227, St. Vincent, 573 fathoms. Station 266, Grenada, 461 fathoms. Station 288, Barbados, 399 fathoms.

Ophiomitra exigua? LYM.

Station 100, off Morro Light, 250-400 fathoms. Station 270, St. Vincent, 75 fathoms. Station 296, Barbados, 84 fathoms.

Ophiomitra valida LYM.

Station 119, 18° 12' N., 64° 55' W., 1105 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 171, Guadeloupe, 183 fathoms. Station 175 (young), Dominica, 611 fathoms. Station 193, Martinique, 169 fathoms. Station 216, St. Lucia, 154 fathoms. Station 218, St. Lucia, 164 fathoms. Station 224, St. Vincent, 114 fathoms. Sta-

tion 232, St. Vincent, 88 fathoms. Station 233, St. Vincent, 174 fathoms. Station 239, Grenadines, 338 fathoms. Station 240, Grenadines, 164 fathoms. Station 241, Grenadines, 163 fathoms. Station 269, St. Vincent, 124 fathoms. Station 270, St. Vincent, 75 fathoms. Station 272, Barbados, 76 fathoms. Station 277, Barbados, 106 fathoms. Station 283, Barbados, 237 fathoms. Station 290, Barbados, 73 fathoms. Station 296, Barbados, 84 fathoms. Station 297, Barbados, 123 fathoms. Bartlett, Station 5, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 288 fathoms. Station 316, $32^{\circ} 7' N.$, $78^{\circ} 37' 30'' W.$, 229 fathoms.

Ophiocamax fasciculata sp. nov.

Plate VII. Figs. 92-94.

Special Marks.—Disk covered with thin, small, smooth scales, of which there are about ten radiating rows in each interbrachial space, and which are beset by scattered, short, thin spines. Radial shields smooth and regular, and joined their whole length.

Description of an Individual (Station 209).—Diameter of disk 15 mm. Width of arms close to disk 4.5 mm. About twenty-three long, smooth, crowded mouth-papillæ to each angle, arranged in two or three tiers. On the upper part of the jaw-plate are about seven very short, blunt teeth, and, below these, usually eight tooth-papillæ arranged in pairs. Often the teeth do not stand immediately one above the other, but partly alternate. Mouth-shields smooth and a little swollen, of a wide heart-shape with a slight lobe outward; length to breadth, 2 : 2. Side mouth-shields wide and meeting fully within. Under arm-plates wide triangular, with a sharp angle within, rounded lateral corners, and wavy sides. They are considerably swollen near the middle. Side arm-plates stout, with a thick spine-ridge; they meet both above and below. Upper arm-plates much rounded triangular, with the outer margin swollen. Disk thick, flat on top and not constricted in the interbrachial spaces. It is covered with thin, smooth overlapping scales, of which there are ten or twelve radiating rows in each upper interbrachial space. Above, the disk is beset with short, slender, smooth, tapering spines. Radial shields flat and smooth, of a short pear-seed shape, and joined throughout. Length to breadth, 3 : 2. Six long flattened arm-spines bearing thorns on their two edges. The second is often as long as three arm-joints, the third nearly as long as two, and the fourth and fifth a little longer than one, while the uppermost and lowest are shortest of all. Three and sometimes four spine-like tentacle-scales to each pore, standing in a clump and turned inward. Color in alcohol, disk gray; arms pale yellowish.

A very fine specimen from Station 147 had a disk of 20 mm. and arms about 180 mm. long. There were usually but five spines, the uppermost short one being wanting, while the second was sometimes as long as five joints. The disk-scales were thicker than in the type, the basal tentacle-scales longer and

more numerous, and the under arm-plates and spine-ridges more swollen. The disk-spines were few and scattered. *O. fasciculata* stands between *O. vitrea* and *O. hystrix*; but the former has nine arm-spines and the upper arm set with fine points, while the latter has eight arm-spines and much coarser disk-scales bearing coarse thorny stumps.

Station 145, St. Kitts, 270 fathoms. Station 147, St. Kitts, 250 fathoms. Station 148, St. Kitts, 208 fathoms. Station 209, Martinique, 189 fathoms. Station 295, Barbados, 180 fathoms.

Ophiocamax hystrix LYM.

Station 134, Santa Cruz, 248 fathoms. Station 148, St. Kitts, 208 fathoms. Station 157, Montserrat, 120 fathoms. Station 158, Montserrat, 148 fathoms. Station 209, Martinique, 189 fathoms. Station 224, St. Vincent, 114 fathoms. Station 233, St. Vincent, 174 fathoms. Station 238, Grenadines, 127 fathoms. Station 241, Grenadines, 163 fathoms. Station 269, St. Vincent, 124 fathoms. Station 274, Barbados, 209 fathoms. Station 280, Barbados, 221 fathoms. Station 291, Barbados, 200 fathoms. Bartlett, Station 5, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 228 fathoms. Bartlett, Station 29, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms.

Ophiothamnus vicarius LYM.

Station 100, off Morro Light, 250–400 fathoms. Station 175 (young), Dominica, 611 fathoms. Station 190, Dominica, 542 fathoms (young), sp. ? Plate VI. Fig. 88. Station 204, Martinique, 476 fathoms. Station 315, $32^{\circ} 18' 20''$ N., $78^{\circ} 43' W.$, 225 fathoms. Station 316, $32^{\circ} 7' N.$, $78^{\circ} 37' 30'' W.$, 229 fathoms.

OPHIOCOPA * gen. nov.

Disk covered with fine imbricated scales, which may bear grains; and small radial shields. Numerous close-set mouth-papillæ, with teeth but no tooth-papillæ. Side arm-plates nearly meeting above and below. Some of the arm-spines flattened and widened like an oar-blade. Two long genital openings in each interbrachial space.

Ophicopa spatula sp. nov.

Plate VII. Figs. 95-98.

Special Marks. — Five arm-spines, which, near base of arm, are flat and all more or less widened. Five papillæ on each side of a mouth-angle, whereof the outermost is widest. Granules on upper margin of disk.

Description of an Individual. — Diameter of disk 9 mm. Width of arm

* ὄφις, snake; κώπη, oar.

near disk 2 mm. Five crowded mouth-papillæ on either side of an angle, whereof the four innermost are small and narrow, while the outermost one is as wide as three of them. Four teeth, of which the upper and the under one are more or less pointed, while the other two are wide with a curved cutting edge. Mouth-shields of a wide diamond-shape with rounded angles; length to breadth, 1.5 : 1.5. Side mouth-shields long and tapering inward to a point; their outer end widened so as to embrace a corner of the mouth-shield. Under arm-plates much wider than long, of a broad shield-shape, with a wide curve without, re-entering curves on the sides, and a very obtuse angle within. Side arm-plates not prominent, nearly or quite meeting above and below. Upper arm-plates much wider than long, transverse diamond-shape with lateral angles sharp. Disk covered with smooth flat imbricated scales, the largest 1 mm. long; between the radial shields, in interbrachial space, there are four or five radiating rows. Along margin of disk is an irregular line of granules. Radial shields rounded, a little swollen, about as broad as long, closely joined; length to breadth, 1.5 : 1.5. Genital openings large and extending from mouth-shield to margin of disk. Five arm-spines, whereof the lowest is shortest, about as long as one arm-joint, and blunt and flattened; the two uppermost are also flattened, but sharp, and about as long as two joints; the two middle ones are, near base of arm, much flattened, and are widened at their tip like a spatula and microscopically serrated on their edges: farther out, they are simply wide and flat. Two oval, rather large tentacle-scales to each pore. Color in alcohol, gray.

"Challenger" Expedition, Station 219, 1° 50' S., 146° 42' E., 150 fathoms, mud. One specimen.

Ophiothrix Suensonii LTK.

Station 127, Santa Cruz, 38 fathoms. Station 142, Flannegan Passage, 27 fathoms. Station 152, St. Kitts, 122 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 189, Dominica, 84-120 fathoms. Station 247, Grenada, 170 fathoms. Station 249, Grenada, 262 fathoms. Station 262, Grenada, 92 fathoms. Station 269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 276, Barbados, 94 fathoms. Station 277, Barbados, 106 fathoms. Station 285, Barbados, 13-40 fathoms. Station 286, Barbados, 7-45 fathoms. Station 290, Barbados, 73 fathoms. Station 292, Barbados, 56 fathoms. Station 293, Barbados, 82 fathoms. Station 294, Barbados, 137 fathoms. Station 298, Barbados, 120 fathoms.

Ophiothrix angulata AYRES.

Station 142, Flannegan Passage, 27 fathoms. Station 152, St. Kitts, 122 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 177, Dominica, 118 fathoms. Station 203, Martinique,

96 fathoms. Station 241, Grenadines, 163 fathoms. Station 246, Grenada, 154 fathoms. Station 247, Grenada, 170 fathoms. Station 249, Grenada, 262 fathoms. Station 285, Barbados, 13-40 fathoms. Station 292, Barbados, 56 fathoms. Bartlett, Station 30, 21° 26' 30'' N., 86° 28' 40'' W., 51 fathoms. Bartlett, entrance to Port Royal, Jamaica, 100 fathoms.

Ophioscolex tropicus LYM.

Station 195, Martinique, 502½ fathoms. Station 266, Grenada, 461 fathoms. Station 211, Martinique, 357 fathoms. Station 273, Barbados, 103 fathoms.

Young specimens resemble the young of *O. purpureus*, but have much more regular mouth-papillæ and flatter arm-spines.

Ophioscolex glacialis MÜLL. & TR.

Station 336, 38° 21' 50'' N., 73° 32' W., 197 fathoms.

From the following three stations, lying much farther to the south, there were specimens having shorter and more numerous mouth-papillæ, and much thinner skin. I prefer to consider them as varieties, until additional specimens shall prove their final relations.

Station 185, Dominique, 333 fathoms (young). Station 274, Barbados, 209 fathoms (young). Station 293, Barbados, 82 fathoms (young).

OPHIOTOMA * gen. nov.

Disk covered by a thick, naked skin, which conceals the small shapeless radial shields. Numerous mouth-papillæ and teeth; no tooth-papillæ. Arm-spines hollow, as in *Ophiacantha*, and smooth. Upper arm-plates present. Two genital openings in each interbrachial space.

The genus may be called an *Ophioscolex* with upper arm-plates and hollow arm-spines.

Ophiotoma coriacea sp. nov.

Plate II. Figs. 1-3.

Special Marks.—A dozen spiniform or tooth-like papillæ to each mouth-angle, besides two minute ones under each of the second mouth-tentacles. Five smooth, slender, tapering arm-spines.

Description of an Individual.—Diameter of disk 16 mm. Width of arm near disk 3 mm. Mouth-angle elongated and bearing about a dozen papillæ, whereof the outer ones incline to be spiniform, while those within are somewhat more flattened and tooth-like. The second mouth-tentacle has also a couple of minute spiniform scales, which stand on the side mouth-shields. Seven or eight stout, flat spear-head-shaped teeth. Mouth-shields wide triangular with rounded corners; length to breadth, 2.5 : 1.5. Side month-

* ὄφης, snake; τομή, a cut.

shields narrow within and not quite meeting, while without they spread inward to the first under arm-plate, and upward round the corner of the mouth-shield to the head of the genital opening. Under arm-plates small, about as broad as long; shield-shaped with a feeble angle inward; length to breadth, 1.2 : 1.2. Side arm-plates flat with an ill-marked spine-crest at their outer margin; they meet below, but not above. Upper arm-plates wider than long, hexagonal with outer and inner angles rounded, and lateral angles sharp. Disk rather thick and covered by a tough skin, which exhibits obscurely below a fine scaling, and above a few very minute, scattered spines. Over each side of the arms is a swelling which looks like a radial shield, but is really the head of the large genital plate, the small radial shield being wholly hidden under the skin. Genital openings large, and extending from mouth-shield to margin of disk. Five slender, delicate, tapering, rounded hollow arm-spines. No tentacle-scales outside the mouth. Color in alcohol, disk greenish; arms pale brown.

Station 308, 41° 24' 45" N., 65° 35' 30" W., 1242 fathoms, 1 specimen.

Ophiosciasma granulatum sp. nov.

Plate VII. Figs. 99-102.

Special Marks. — Minute papillæ on edges of mouth-angles. Arms flat and rather wide. Two flat, translucent arm-spines with rough edges.

Description of an Individual. — Diameter of disk 6 mm. Arms very low and flat; width near disk 1.2 mm. Mouth-angles rather large, and bearing on their edges a row of minute saw-like papillæ; the two or three at the apex are somewhat larger. Mouth-shields small and rounded, with a slight angle inward; length to breadth, .7 : .7. Side mouth-shields wide and fully meeting within. Under arm-plates rather thick, longer than broad, wider without than within, and with deep re-entering curves on the sides, where are the tentacle-pores. Side arm-plates projecting in a strong spine-ridge, meeting neither above nor below. The upper surface, covered only by a thin skin, shows distinctly the tops of the elongated arm-bones with the pairs of circular muscle-fields between them. Farther out on the arm there appears a central depression, which towards the end penetrates quite through, until, at the tip, the bone appears as two long slender pieces curving towards each other, and uniting at either extremity. Disk covered with skin having scattered grains on its surface, which are opaque white. No scales or radial shields are visible. Two translucent rough arm-spines, a little longer than a joint, and standing at a strong angle to the arm. They are composed of two flattened spicules soldered together, each of which has two or three spurs on its free edge (Fig. 101), and are enclosed in a skin-bag. Tentacles simple, fleshy, and very thick. No tentacle-scales. Color in alcohol, pale yellowish, with yellow tentacles.

A larger specimen with a disk of 10 mm. had arms 45 mm. long; but did not differ except in having many of the disk granules buried in the thick skin.

Station 203, Martinique, 96 fathoms, 1 specimen. Bartlett, entrance to Port Royal, Jamaica, 100 fathoms, 1 specimen.

The species is readily distinguished from *O. attenuatum* by much wider arms, and by two instead of three arm-spines.

Ophiogeron supinus sp. nov.

Plate VII. Figs. 103-106.

Special Marks. — Arms very flat and covered with thick, loose skin. Two glassy, slender, smooth arm-spines enclosed in a common skin-bag.

Description of an Individual. — Diameter of disk 18 mm. Length of arm about 85 mm. Width of arm near disk 5 mm. Height of arm 2.5 mm. On either side of the large mouth-angle is an irregular row of minute, conical papillæ; a cluster of similar tooth-papillæ stands on the jaw-plate; and, above these, are small, spine-like teeth. Mouth-shields small, as broad as long, presenting an angle within and a curve without. Side mouth-shields long and pretty wide; fully meeting within; and, at their outer ends, extending much beyond the mouth-shield. At base of arm all plates are quite obscured by skin; but at the tip may be seen small under arm-plates, longer than broad, and pentagonal, with re-entering lateral sides and an angle within. The side arm-plates then meet below, but do not encroach on the upper surface. As there are no upper plates, the arm-bone may be seen, divided into its two embryonic halves. Disk uniformly covered by a soft, naked, wrinkled skin, which was much torn in the specimens observed. Genital openings long and large, extending from mouth-shield to margin of disk. Two glassy, smooth, slender arm-spines, longer than a joint, and enclosed in a common skin-bag. No tentacle-scales. Color in alcohol, pale brown.

Station 148, St. Kitts, 208 fathoms, 2 specimens. Station 291, Barbados, 200 fathoms. Station 230, St. Vincent, 464 fathoms (young).

The long flat arms covered by loose skin readily distinguish this species from *O. edentulus*.

There are, under the skin, just over the arms, small rounded radial shields, and, articulated to them, very short genital scales and plates, very much as in *Ophiobursa*. In the substance of the skin are imbedded fine scales, especially near the disk margin.

Ophiohelus umbella LYM.

Station 300, Barbados, 82 fathoms.

Ophiomyces mirabilis LYM.

Station 222, St. Lucia, 422 fathoms.

Ophiomyces frutectosus LYM.

Station 281, Barbados, 288 fathoms. Station 282, Barbados, 154 fathoms.

Ophiobursa Perrieri sp. nov.

Plate II. Figs. 4-6.

Special Marks. — Skin of disk naked, except clumps of short spines over the radial shields. No spines on upper side of arms.

Description of an Individual. — Diameter of disk 22 mm. Length of arm 270 mm. Width of arm close to disk 4 mm. The mouth-angles, which are covered with thick skin, have a few short spiniform papillæ at the apex, arranged chiefly on the jaw-plate. Mouth-shields and other plates about the mouth quite obscured by thick skin. Top of arm covered also by a very thick, tough skin, but destitute of anything like upper arm-plates, except a certain amount of thin lime-crust, underlying it. Under arm-plates swollen, rounded, about as long as broad, and broader without than within. They are obscured by the overlying skin. Side arm-plates like little flaps or pads inclining outward. Disk rounded and wrinkled, covered by a thick skin which is naked except over the radial shields where are clusters of very short, blunt spines. Six equal, short, blunt arm-spines, not as long as a joint; when stripped of the thick covering skin, they are rough and translucent. Tentacles large and simple. No tentacle-scales. Color in alcohol, light yellowish brown.

Bartlett, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 288 fathoms, 1 specimen.

Ophiobursa serpens sp. nov.

Plate VIII. Figs. 117-119.

Special Marks. — Three short, glassy, slightly thorny arm-spines covered by thick skin. Mouth-angle long and bearing a line of minute papillæ on either side.

Description of an Individual. — Diameter of disk 16 mm. Length of arm (from another specimen) above 140 mm. Width of arm near disk 2.8 mm. On either side of the inner part of each mouth-angle is a line of about five minute papillæ covered by thick skin. Five small, spine-like teeth, of which the uppermost are longest. A thick skin hides mouth-shields, side mouth-shields, and under arm-plates. Side arm-plates project like little flaps. Disk covered by a naked, wrinkled skin; along its margin runs a row of minute peg-like spines, of which there is also a radiating row over the place of each radial shield. Genital openings large and extending from the region of the mouth-shield to margin of disk. Three short, glassy, slightly thorny arm-spines, of which the lowest is longest and about as long as a joint; they are covered by skin. No tentacle-scales. Color in alcohol, above, umber variegated with yellowish brown; below, similar but lighter.

Station 278, 69 fathoms, 2 specimens.

O. serpens differs from *O. Perrieri* in having three arm-spines instead of five; and in longer mouth-angles with minute papillæ. The fact that it preserves

its color in alcohol suggests that it lives also in shallow water, although now found for the first time in 69 fathoms.

Ophiobyrsa hystrioides sp. nov.

Plate VIII. Figs. 120-122.

Special Marks. — At apex of mouth-angle two or three large, peg-like mouth-papillae; and two or three others much smaller, on either side, arranged in a line which runs high up on the side of the angle. Five slim, glassy arm-spines covered with skin.

Description of an Individual.— Diameter of disk 20 mm. Length of arm 187 mm. Width of arm near disk 5.5 mm. Height of arm 3 mm. The somewhat long and narrow mouth-angle bears at its end a pair of stout, peg-like papillae, and sometimes a third standing above them; on either side of the angle, considerably above its lower edge, is a line of three similar but much smaller papillae. Mouth-shields and side mouth-shields entirely hidden by skin, as are the plates of the arm. On removing the skin, the under arm-plates are seen to be about 1 mm. long and squarish, with outer corners cut off. Side arm-plates like ridges, tapering at both ends, and with their lower end a little inserted between the under plates. There is nothing to represent upper arm-plates except two small nodules, one on each side of the median line. These are homologous with the double row of spine-bearing tubercles found in *O. rudis*. Disk thick and swollen, and covered by a tough skin; its upper surface is sparsely set with very short spines, more numerous and longer over the region of the radial shields, but all covered and obscured by the disk-skin. Genital openings large, and nearly extending to margin of disk. Five slender, slightly rough, glassy, nearly equal arm-spines, about as long as one and a half arm-joints. They are covered by thick skin. Very large fleshy tentacles, but no tentacle-scales. Color in alcohol, pale straw, with yellow tentacles.

“Porcupine” Expedition, 1869, Station 65, northwest of Shetland Islands, 345 fathoms, water 1° 7 Cent.

This is the species mentioned by Sir Wyville Thomson on page 123 of the “Depths of the Sea.” It comes from the “cold area,” where the sea is at or below the freezing point of fresh water; whereas the three other species, *O. rudis*, *O. serpens*, and *O. Perrieri*, from Australia and the West Indies, inhabit much warmer water. By its small papillae on the sides of the mouth-angles this species differs from the typical *Ophiobyrsa* and approaches *Ophiocoelax*; the joints of the arm-bones are, however, essentially as in *Ophiobyrsa*.

Ophiomyxa tumida sp. nov.

Plate I. Figs. 1-3.

Special Marks. — Four or five slender, tapering, slightly rough arm-spines. Only a trace of upper arm-plates. Radial shields small and not bedded in a cluster of scales. A single marginal line of small plates round the disk.

Description of an Individual ($21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W.). — Diameter of disk 13 mm. Width of arm close to disk 3 mm. Length of arm 95 mm. Four flat, rounded papillæ with rough cutting edges on each side of the mouth-angles; and five or six teeth of similar form, but with nearly smooth edges. Mouth-shields showing indistinctly under the skin as transverse oval figures. On boiling the skin of the arm in potash there are found under arm-plates of a shield-shape, with a strong central notch and two angles on the outer side and a peak within; while the side arm-plates are seen as ridges nearly meeting below, where they are thickest, and have a notch in their outer side through which passes the tentacle. Only a trace of upper plates in form of little crusts of lime. Disk five-sided with re-entering curves; covered by a naked, loose, wrinkled skin, under which is found a continuous marginal line of small plates, which runs quite round the entire edge. Attached by their outer ends to this line of plates are small, short, club-shaped radial shields, which have no such cluster of small scales as are often found in the genus. Four or five slender, somewhat flattened, blunt, slightly rough arm-spines, about as long as a joint. No tentacle-scales. Color in alcohol, disk gray; arms straw.

Usually this genus has low side arm-plates, and a high arch of separate pieces which represent the upper arm-plates. The latter are nearly wanting in *O. tumida*, while the side arm-plates run somewhat farther upwards than common.

Two other lots from Stations 319, $32^{\circ} 25' N.$, $77^{\circ} 42' 30'' W.$, 262 fathoms, and 320, $32^{\circ} 33' 15'' N.$, $77^{\circ} 30' 10'' W.$, 257 fathoms, may be the young of this species. The specimens differed in having, with a disk of 9 mm., two, or at most three, arm-spines. The radial shields were as in *O. tumida*, but there was no well-marked marginal line of plates. There were, however, microscopic crust-like scales under the disk skin, which may also be detected in *O. tumida*. The specimens were fertile and were viviparous.

Station 132, Santa Cruz, 115 fathoms. Station 139, Santa Cruz, 218 fathoms. Station 146, St. Kitts, 245 fathoms. Station 147, St. Kitts, 250 fathoms. Station 148, St. Kitts, 208 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 158, Montserrat, 148 fathoms. Station 165, Guadeloupe, 277 fathoms. Station 172, Guadeloupe, 62–180 fathoms. Station 177, Dominica, 118 fathoms. Station 203, Martinique, 96 fathoms. Station 205, Martinique, 334 fathoms. Station 220, St. Lucia, 116 fathoms. Station 231, St. Vincent, 95 fathoms. Station 232, St. Vincent, 88 fathoms. Station 238, Grenadines, 127 fathoms. Station 241, Grenadines, 163 fathoms. Station 246, Grenada, 154 fathoms. Station 247, Grenada, 170 fathoms. Station 259, Grenada, 159 fathoms. Station 269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms. Station 281, Barbados, 288 fathoms. Station 285, Barbados, 13–40 fathoms. Station 290, Barbados, 73 fathoms. Station 291, Barbados, 200 fathoms. Station 296, Barbados,

84-125 fathoms. Bartlett, $21^{\circ} 23' 19''$ N., $82^{\circ} 54' 42''$ W., 300 fathoms. Santiago de Cuba, 288 fathoms. Station 319, $32^{\circ} 25'$ N., $77^{\circ} 42' 30''$ W., 262 fathoms. Station 320, $32^{\circ} 33' 15''$ N., $77^{\circ} 30' 10''$ W., 257 fathoms.

Ophiomyxa serpentaria sp. nov.

Plate VIII. Figs. 114-116.

Special Marks. — Three short, tapering, blunt, translucent arm-spines enclosed in skin-bags. Three small mouth-papillæ on either side of the mouth-angle, near its apex. Under and side arm-plates soldered together. No upper arm-plates. Skin of disk without apparent scales and with only small radial shields.

Description of an Individual. — Diameter of disk 19 mm. Length of arm 50 mm. Width of arm near disk 3 mm. On either side of each mouth-angle, near its apex, are three mouth-papillæ, of the usual flattened form with saw-like edge. The innermost one is largest; the two outer ones are smaller, and more or less obscured by thick skin. Teeth similar to innermost mouth-papilla. Mouth-shields and side mouth-shields wholly hidden by thick skin. On removing the skin there are seen under arm-plates of elongated shape with deep re-entering curves on their sides where are the tentacle-pores; they are soldered together and with the side arm-plates, and have on their upper surface four knobs for attachment to the arm-bones. Side arm-plates thick and shapeless, extending to the upper surface of the arm. No upper arm-plates. Disk covered by a smooth tough skin, which under the microscope is seen to be full of little, rounded, thin scattered scales. There is no marginal row of plates; and the very small radial shields, which lie in the angle made by the arm with the disk, have no bed of scales. Genital openings running from mouth-shields rather more than half-way to margin of disk. Three arm-spines about 1.7 mm. long, widely spaced and standing at a large angle with the arm; their base is enclosed by thick skin, which being stripped off, they appear cylindrical tapering, blunt, and translucent; under the microscope they are slightly rough. Tentacles large and fleshy, but without scales. The articulating faces of the arm-bones do not approach the *Astrophyton* form so much as do those of other members of the genus, but come nearer the type of the true *Ophiurans*.

"Porcupine" Expedition, Station 54, between Færø Islands and Hebrides, 363 fathoms, water $0^{\circ}.3$ Cent., 1 specimen.

The under arm-plates are shaped somewhat like those of *O. vivipara*, while the disk-skin, almost without lime-scales, reminds one of *O. australis*. The absence of upper arm-plates marks this new species as the Northern correspondent of the Antarctic *O. vivipara*, which is plentiful; and it is therefore singular that only one specimen of the Northern representative should thus far have been found.

Ophiochondrus crassispinus sp. nov.**Plate VII. Figs. 111-113.**

Special Marks. — Seven or eight thick, short, blunt, slightly rough arm-spines. Radial shields long and prominent. Mouth-papillæ sharp and separated.

Description of an Individual. — Diameter of disk 6 mm. Length of arm 20 mm. Width of arm close to disk 2 mm. Three short, stout, sharp mouth-papillæ on each side of an angle, and one similar but larger at the apex; this last may be considered as the lowest tooth. Mouth-shields somewhat swollen, about as broad as long, with an angle inward. Side mouth-shields large, thick and wide; broader without than within where they meet. First under arm-plate small, longer than broad, with an angle inward. Those beyond are separated one from another, and are four-sided and much wider than long, with a slight re-entering curve without. Side arm-plates with narrow, prominent spine-ridges; meeting below but separated above by fan-shaped upper arm-plates which present a truncated angle inward. Disk thick, sparsely beset with a fine granulation, except on the radial shields which are prominent and large; they are much longer than broad, wider without than within, and separated; their ends are rounded; length to breadth, 2 : .6. Seven or eight short, blunt, slightly rough arm-spines, which stand at a considerable angle to the arm; they are nearly equal and not so long as a joint; those in the middle often are swollen at their base. No tentacle-scales. Color in alcohol, pale straw.

Station 316, 32° 7' N., 78° 37' 30" W., 229 fathoms, 1 specimen.

This species is well distinguished from *O. stelliger* by its great naked radial shields and numerous arm-spines; and from *O. convolutus* by different mouth-papillæ and no tentacle-scale.

Ophiochondrus squamosus.**Plate VII. Figs. 108-110.**

Special Marks. — Disk covered above by thick, lumpy, separated plates, and below by lumpy scales. Seven or eight short conical arm-spines. Lower arm-plates obscured by thick skin.

Description of an Individual. — Diameter of disk 6.5 mm. Length of arm 40 mm. Width of arm near disk without spines 1.3 mm. Three small, somewhat flattened, separated papillæ on each side of a mouth-angle, whose apex is occupied by the lowest tooth, which is large and of a wide spear-head shape. Mouth-shields small, of a transverse oval form; length to breadth, .5 : .6. Side mouth-shields scarcely visible under the thick skin; they are narrow and meet within. Basal under arm-plates obscured by thick skin; farther out on arm, they appear as thick, widely separated transverse oval plates, and near the end they are squarish and nearly or quite touch each other. Side arm-

plates projecting as narrow spine-crests, and meeting neither above nor below. Upper arm-plates much wider than long, transverse oval, thick and microscopically tuberculated; length to breadth, .5 : .9. Disk rather thick and covered above by high, lumpy, irregular, microscopically tuberculous plates, which are widely separated by depressed lines. Interbrachial spaces below covered by lumpy scales. Radial shields pear-seed-shape, small, and separated by a single row of plates; length to breadth, 1 : .5. Seven or eight (sometimes only six) short, stout, conical, equal arm-spines, about as long as a joint. Two minute, rounded tentacle-scales. Color in alcohol, nearly white; tentacles brownish.

Station 147, St. Kitts, 250 fathoms, 1 specimen.

At first sight this species seems like a new genus, owing to its peculiar disk covering; but I do not doubt it belongs under *Ophiochondrus*, although I have had no chance to examine the arm-bones.

Ophiochondrus convolutus Lym.

Station 100, off Morro Light, 250–400 fathoms. Station 208, Martinique, 213 fathoms. Station 219, St. Lucia, 151 fathoms. Station 224, St. Vincent, 114 fathoms. Station 232, St. Vincent, 88 fathoms. Station 233, St. Vincent, 174 fathoms. Station 238, Grenadines, 127 fathoms. Station 253, Grenada, 92 fathoms. Station 254, Grenada, 164 fathoms. Station 269, St. Vincent, 124 fathoms. Station 280, Barbados, 221 fathoms.

Hemieuryale tuberculosa sp. nov.

Plate VIII. Figs. 123-127.

Special Marks. — Upper arm-plate persistent to base of arm and there surrounded by large grains or tubercles. Two short flattened arm-spines which grow larger towards their ends.

Description of an Individual (Station 203). — Diameter of disk 6.5 mm. Length of arm 37 mm. Width of arm near disk 2 mm. Three or four small, close-set, bead-like papillæ on each side of a month-angle, and just above its apex appears the lowest of the short, thick rounded teeth. Mouth-shields small and five-sided, with rounded corners and an angle inward; length to breadth, 1 : 1. Side month-shields ovoid and swollen, nearly as large as mouth-shields, and like them microscopically tuberculous. Under arm-plates swollen and soldered with surrounding parts, so that their outlines are indistinct; small, rounded, and separated from one another. Side plates a little swollen, meeting below, but rising only about half-way up the side of the arm. At its tip however they meet broadly above, where there is a small bead-like upper arm-plate. A few joints farther in, it becomes larger and has a supplementary piece at either corner, and a granule inside it, in the centre, and separating the side arm-plates (Fig. 127). Still farther in, the upper arm-plates

have a transverse oval shape, and are separated by a group of five tubercles arranged in two rows, while the supplementary corner piece has become as large as the plate (Fig. 126). At the base of the arm the same arrangement prevails; but the upper plate is proportionately smaller and less regular, while the intermediate tubercles, from three to five in number, are conspicuous (Fig. 125). Disk small, and strongly contracted in the interbrachial spaces. It is covered by large radial shields which are much longer than wide and microscopically tuberculous; length to breadth, 2.2 : 1. In the centre of the disk is a five-sided space covered by closely soldered plates and tubercles, from which radiate five brachial and five interbrachial narrow spaces; the latter covered by plates, the former by plates bearing large tubercles. Lower interbrachial spaces covered by small, swollen, closely soldered plates. Two short, stout, flattened arm-spines not more than half as long as a joint, and growing wider at the end. At tip of arm there is but one spine. One round tentacle-scale. Color in alcohol, above variegated with shades of yellowish brown and with some of the tubercles white; below lighter with a broad longitudinal arm-band of purplish.

Station 132, Santa Cruz, 115 fathoms. Station 203, Martinique, 96 fathoms.

This species, with the top of its arm covered by polished beads of various colors, presents a curious aspect. It is readily distinguished from *H. pustulata* by the persistence of the upper arm-plate; and by having tubercles, instead of a smooth mosaic, on the upper side of the arm.

Hemieuryale pustulata LYM.

Station 132, Santa Cruz, 115 fathoms. Station 203, Martinique, 96 fathoms. Station 276, Barbados, 94 fathoms. Station 277, Barbados, 106 fathoms. Station 296, Barbados, 94 fathoms.

Sigsbeia murrhina LYM.

Station 132, Santa Cruz, 115 fathoms. Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 166, Guadeloupe, 150 fathoms. Station 203, Martinique, 96 fathoms. Station 209, Martinique, 189 fathoms. Station 210, Martinique, 191 fathoms. Station 211, Martinique, 357 fathoms. Station 219, St. Lucia, 151 fathoms. Station 220, St. Lucia, 116 fathoms. Station 222, St. Lucia, 422 fathoms. Station 224, St. Vincent, 114 fathoms. Station 232, St. Vincent, 88 fathoms. Station 233, St. Vincent, 174 fathoms. Station 238, Grenadines, 127 fathoms. Station 241, Grenadines, 163 fathoms. Station 247, Grenada, 170 fathoms. Station 249, Grenada, 262 fathoms. Station 269, St. Vincent, 124 fathoms. Station 277, Barbados, 106 fathoms.

OPHIOBRACHION gen. nov.*

Entire animal clothed in a thick skin which hides the underlying plates and is beset on the disk with spines. Arms long, slender and serpentine. Upper arm-plates wanting. Side arm-plates forming a low ridge with a line of little mamelons each bearing a hooklet which answers to an arm-spine. Tentacles large and simple. Mouth-angles rounded, covered with thick skin and bearing at their apex a clump of spiniform papillæ. Two large genital openings in each interbrachial space.

The presence of hooklets, which replace the arm-spines *quite to the base of the arm*, is a feature found in no other Ophiuran; and, indeed, in none of the Astrophytons; for the hooklets of these, when found at the base of the arm, are not homologous with arm-spines, because they do not stand on the side arm-plate. At the tip of the Astrophyton arm there are, however, strictly homologous spines, like compound hooks, but these, as they approach the base of the arm, change gradually to short thick spines, or tentacle-scales, as they may also be called. (See Bull. M. C. Z., VI. 2, Plate XIX. Figs. 493-495.) As might be expected, the joints between the arm-bones are on the modified hour-glass pattern, similar to that found in Sigsbeia, and therefore approaching the corresponding structure among Astrophytons. In a word, this new genus belongs with such genera as Ophiomyxa and Ophiobyrsa, and stands nearest the simple-armed Astrophytons.

Ophiobrachion uncinatus sp. nov.

Plate VIII. Figs. 128-131.

Special Marks. — Arms six or seven times the diameter of disk. Seven or eight compound hooklets mounted on little cylindrical bases which rise from the side arm-plates.

Description of an Individual. — Diameter of disk 43 mm. Length of arm 270 mm. Width of arm close to disk 5 mm. Mouth-angle covered with thick skin and bearing at the apex an irregular clump of short, sharp spines, like prickles. All the mouth-shields obscured by thick skin, except the madreporic, whose transverse oval outline may be distinguished. It has a few irregular pores near its outer margin. Under arm-plates obscured by a thick skin, on removing which they are found to be of a rounded quadrangular form, wider without than within, swollen, and sometimes so cut out on the lateral sides, where the tentacles pass through, as to assume an axe-shape. They are continued upward by shapeless, rounded side arm-plates, which appear externally as well-marked spine-ridges, bearing a row of seven or eight small cylindrical knobs, each with a hole in its top to which is articulated a hooklet. The lowest knob is opposite the tentacle. No upper arm-plates; there are,

* ὄφεις, snake; βραχίον, arm.

however, two little lime nodules bedded in the skin of that region, over each joint. Disk large and flat, covered by a thick, somewhat wrinkled skin, densely beset above and below by short spines, whose bases are enclosed in a sheath of skin, beyond which projects a sharp, translucent point, or a fork. The arm-spines are represented by a row of seven or eight minute compound hooklets, about 1 mm. long. They are translucent and end in a sharp hook, and have two or three curved spurs on the same side. At the very tip of the arm the structure does not vary, except that the hooklets with their knob-like bases are reduced to two. The large smooth tentacles have no special scales. Color in alcohol, disk light yellowish brown; arms paler.

Bartlett, south side of Cuba, $19^{\circ} 48' 47''$ N., $77^{\circ} 23''$ W., 250 fathoms, 1 specimen.

Astrophyton cœcilia LTK.

Station 269, St. Vincent, 124 fathoms. Station 290, Barbados, 73 fathoms. Station 296, Barbados, 84 fathoms.

Gorgonocephalus mucronatus LYM.

Bartlett, Station 5, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 288 fathoms. Station 139, Santa Cruz, 218 fathoms, var. ? Station 269, St. Vincent, 124 fathoms, var. ?

Astrocnida isidis LYM.

Station 156, Montserrat, 88 fathoms. Station 290, Barbados, 73 fathoms. Station 292, Barbados, 56 fathoms. Station 296, Barbados, 84 fathoms. Station 298, Barbados, 120 fathoms.

Astrogomphus vallatus LYM.

Station 209, Martinique, 189 fathoms. Station 224, St. Vincent, 114 fathoms. Station 232, St. Vincent, 88 fathoms. Station 269, St. Vincent, 124 fathoms. Station 318, $31^{\circ} 48' 50''$ N., $77^{\circ} 51' 50''$ W., 337 fathoms.

Astroporpa annulata ÖRST. & LTK.

Station 132, Santa Cruz, 115 fathoms. Station 155, Montserrat, 88 fathoms. Station 178, Dominica, 130 fathoms. Station 203, Martinique, 96 fathoms. Station 241, Grenadines, 163 fathoms. Station 253, Grenada, 92 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 276, Barbados, 94 fathoms. Station 277, Barbados, 106 fathoms. Station 290, Barbados, 73 fathoms. Station 292, Barbados, 56 fathoms. Station 296, Barbados, 84 fathoms. Station 297, Barbados, 123 fathoms. Station 298, Barbados, 120 fathoms. Bartlett, Station 20, off entrance to Port Royal, Jamaica, 50 fathoms.

Astrochele Lymani VLL.

Station 307, 41° 29' 45" N., 65° 47' 10" W., 980 fathoms. Station 309, 40° 11' 40" N., 68° 22' W., 304 fathoms.

Astroschema arenosum LYM.

Station 124, Santa Cruz, 580 fathoms. Station 131, Santa Cruz, 580 fathoms. Station 157, Montserrat, 120 fathoms. Station 159, Guadeloupe, 196 fathoms. Station 173, Guadeloupe, 734 fathoms. Station 227, St. Vincent, 573 fathoms. Station 269, St. Vincent, 124 fathoms. Station 281, Barbados, 288 fathoms.

Astroschema læve LYM.

Station 134, Santa Cruz, 248 fathoms. Station 156, Montserrat, 88 fathoms. Station 157, Montserrat, 120 fathoms. Station 203, Martinique, 96 fathoms. Station 216, St. Lucia, 154 fathoms. Station 218, St. Lucia, 164 fathoms. Station 219, St. Lucia, 151 fathoms. Station 224 St. Vincent, 114 fathoms. Station 231, St. Vincent, 95 fathoms. Station 249, Grenada, 262 fathoms. Station 272, Barbados, 76 fathoms. Station 273, Barbados, 103 fathoms. Station 276, Barbados, 94 fathoms. Station 290, Barbados, 73 fathoms. Station 292, Barbados, 56 fathoms. Station 296, Barbados, 84 fathoms.

Astroschema oligactes LTK.

Station 156, Montserrat, 88 fathoms. Station 164, Guadeloupe, 150 fathoms. Station 220, St. Lucia, 116 fathoms. Station 224, St. Vincent, 114 fathoms. Station 241, Grenadines, 163 fathoms. Station 249, Grenada, 262 fathoms. Station 253, Grenada, 92 fathoms. Station 269, St. Vincent, 124 fathoms. Station 272, Barbados, 76 fathoms. Station 276, Barbados, 94 fathoms. Station 278, Barbados, 69 fathoms. Station 290, Barbados, 73 fathoms. Station 296, Barbados, 84 fathoms. Station 297, Barbados, 123 fathoms. Station 298, Barbados, 120 fathoms. Bartlett, entrance to Port Royal, Jamaica, 100 fathoms. Bartlett, Station 5, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 288 fathoms.

Astroschema tenue LYM.

Station 155, Montserrat, 88 fathoms. Station 156, Montserrat, 88 fathoms. Station 269, St. Vincent, 124 fathoms. Station 276, Barbados, 94 fathoms.

Astroschema brachiatum LYM.

Bartlett, Station 5, 3.3 m. S. E. by E. $\frac{1}{2}$ E. from Santiago de Cuba Light, 288 fathoms.

Ophiocreas spinulosus sp. nov.

Plate VIII. Figs. 132-135.

Special Marks. — Radial shields beset with short, blunt spines, which are continued along the upper side of the arms.

Description of an Individual (Station 269). — Diameter of disk 8 mm. Length of arm 60 mm. Width of arm, 10 mm. from disk, 2.5 mm. Height of arm at same point 3 mm. Mouth-angles well separated from each other and bearing on the upper part of their sides a number of grains which have somewhat the look of mouth-papillæ. Seven short, wide flat teeth, with a rounded cutting edge; below them is an imperfect tooth, or a couple of papillæ. Arms higher than wide, and widest above. The covering skin is smooth and rather loose, and the joints are scarcely indicated. The upper surface bears short blunt spines, a pair to each joint; but these are not found beyond the base of the arm. The first pore beyond the mouth-slit has no tentacle-scale; the second, one; and the next, two, which are cylindrical, blunt, and somewhat tapering, the lower one being about 2 mm. long, and the upper one shorter. Farther out on the arm they become more slender, and at the extreme tip take on the form of minute double hooks. Disk high and angular with interbrachial spaces re-enteringly curved. Radial shields elevated as strongly marked ridges running to the centre and thickly set with short stout blunt spines. Genital openings large and wide, reaching nearly to the roof of the disk. Color in alcohol, pale pink.

The above-described specimen was not fully grown. A large one, with a disk of 13 mm. and arms 385 mm. long, differed only in having the spines more or less obliterated on the radial shields, but much more numerous on the tops of the arms. The arm-spines, also, were comparatively shorter and stouter.

Like *Ophiocamax fasciculata*, *Ophiomusium Lymani*, and many other species, *Ophiocreas spinulosus* lives in great colonies. The tangles often came so clogged with hundreds of specimens that it was necessary to cut them off and throw the mass into alcohol. Mr. Agassiz reports the color of the living animal as brick red. A young specimen with a disk of 3 mm. had no spines on the disk or arms. Spines begin to appear only when the disk has reached 4 or 5 mm.

Station 208, Martinique, 213 fathoms. Station 216, St. Lucia, 154 fathoms. Station 233, St. Vincent, 174 fathoms. Station 269, St. Vincent, 124 fathoms. Station 279, Barbados, 118 fathoms. Station 281, Barbados, 288 fathoms.

Ophiocreas lumbricus LYM.

Station 131, Santa Cruz, 580 fathoms. Station 171, Guadeloupe, 183 fathoms. Station 216, St. Lucia, 154 fathoms. Station 219, St. Lucia, 151 fathoms.

oms. Station 238, Grenadines, 127 fathoms. Station 263, Grenada, 159 fathoms. Station 281, Barbados, 288 fathoms.

Ophiocreas œdipus? LYM.

Station 124, Santa Cruz, 580 fathoms. Station 131, Santa Cruz, 580 fathoms.

The originals dredged by the "Challenger" at Station 344, off Ascension Island, in 420 fathoms, differed from these only in lacking all granulation on the mouth-angle. I suppose they are of the same species.

Astronyx Loveni MÜLL. & TR. (Young.)

Plate VIII. Figs. 136-138.

Station 227, St. Vincent, 573 fathoms. Station 307, $41^{\circ} 29' 45''$ N., $65^{\circ} 47' 10''$ W., 980 fathoms. Station 338, $38^{\circ} 18' 40''$ N., $73^{\circ} 18' 10''$ W., 922 fathoms.

CAMBRIDGE, May, 1883.

DESCRIPTION OF PLATES.

 PLATE I.

- Fig. 1. *Ophiomyxa tumida*, from below; $\frac{5}{4}$.
 Fig. 2. " " from above; $\frac{5}{4}$.
 Fig. 3. " " arm-joints, profile; $\frac{5}{4}$.

PLATE II.

- Fig. 1. *Ophiotoma coriacea*, from below; $\frac{4}{3}$.
 Fig. 2. " " from above; $\frac{4}{3}$.
 Fig. 3. " " arm-joints, profile; $\frac{4}{3}$.
 Fig. 4. *Ophiobyrsa Perrieri*, from below; $\frac{4}{3}$.
 Fig. 5. " " from above; $\frac{4}{3}$.
 Fig. 6. " " arm-joints, profile; $\frac{4}{3}$.

PLATE III.

- Fig. 1. *Pectinura tessellata*, from below; $\frac{3}{2}$.
 Fig. 2. " " from above; $\frac{3}{2}$.
 Fig. 3. " " arm-joints, profile; $\frac{3}{2}$.
 Fig. 4. " *lacertosa*, from below, $\frac{1}{2}$.
 Fig. 5. " " from above; $\frac{1}{2}$.
 Fig. 6. " " arm-joints, profile; $\frac{1}{2}$.
 Fig. 7. " *angulata*, from below; $\frac{3}{2}$.
 Fig. 8. " " from above; $\frac{3}{2}$.
 Fig. 9. " " arm-joints, profile; $\frac{3}{2}$.
 Fig. 10. *Ophiozona marmorea*, from below; $\frac{4}{3}$.
 Fig. 11. " " from above; $\frac{4}{3}$.
 Fig. 12. " " arm-joints, profile; $\frac{4}{3}$.
 Fig. 13. " *clypeata*, from below; $\frac{7}{2}$.
 Fig. 14. " " from above; $\frac{7}{2}$.
 Fig. 15. " " arm-joints, profile; $\frac{7}{2}$.
 Fig. 16. *Ophiocytra tenuis*, from below; $\frac{5}{4}$.
 Fig. 17. " " from above; $\frac{5}{4}$.
 Fig. 18. " " arm-joints, profile; $\frac{5}{4}$.

- Fig. 19. *Ophiernus adpersus*, from below; $\frac{5}{2}$.
 Fig. 20. " " from above; $\frac{5}{2}$.
 Fig. 21. " " arm-joints, profile; $\frac{5}{2}$.
 Fig. 22. *Ophioglypha fusciculata*, from below; $\frac{3}{1}$.
 Fig. 23. " " from above; $\frac{3}{1}$.
 Fig. 24. " " arm-joints, profile; $\frac{3}{1}$.
 Fig. 25. " *abyssorum*, from below; $\frac{3}{1}$.
 Fig. 26. " " from above; $\frac{3}{1}$.
 Fig. 27. " " arm-joints, profile; $\frac{3}{1}$.

PLATE IV.

- Fig. 28. *Ophioglypha scutata*, from below; $\frac{1\frac{1}{2}}{1}$.
 Fig. 29. " " from above; $\frac{1\frac{1}{2}}{1}$.
 Fig. 30. " " arm-joints, profile; $\frac{1\frac{1}{2}}{1}$.
 Fig. 31. " *tenera*, from below; $\frac{1\frac{3}{2}}{1}$.
 Fig. 32. " " from above; $\frac{1\frac{3}{2}}{1}$.
 Fig. 33. " " arm-joints, profile; $\frac{1\frac{3}{2}}{1}$.
 Fig. 34. " *aurantiaca*, from below; $\frac{4}{1}$.
 Fig. 35. " " from above; $\frac{4}{1}$.
 Fig. 36. " " arm-joints; $\frac{4}{1}$.
 Fig. 37. " *falcifera* (adult), from below; $\frac{5}{2}$.
 Fig. 38. " " from above; $\frac{5}{2}$.
 Fig. 39. " " arm-joints, profile, showing the hooked spines; $\frac{5}{1}$.
 Fig. 40. " *convexa*, var. (Station 146), from below; $\frac{7}{2}$.
 Fig. 41. " " from above; $\frac{7}{2}$.
 Fig. 42. " " arm-joints, profile; $\frac{7}{2}$.
 Fig. 43. " " (Station 206), from below; $\frac{7}{2}$.
 Fig. 44. " " from above; $\frac{7}{2}$.
 Fig. 45. " " arm-joints, profile; $\frac{7}{2}$.
 Fig. 46. *Ophiocten Pattersoni*, from below; $\frac{7}{2}$.
 Fig. 47. " " from above; $\frac{7}{2}$.
 Fig. 48. " " arm-joints, profile; $\frac{7}{2}$.
 Fig. 49. *Ophiomastus texturatus*, from below; $\frac{6}{1}$.
 Fig. 50. " " from above; $\frac{6}{1}$.
 Fig. 51. " " arm-joints, profile; $\frac{6}{1}$.
 Fig. 52. *Ophiophyllum petilum?* from below; $\frac{9}{2}$.
 Fig. 53. " " from above; $\frac{9}{2}$.
 Fig. 54. " " arm-joints, profile; $\frac{9}{2}$.

PLATE V.

- Fig. 55. *Ophiomusium Lymani* (young), from below; $\frac{1\frac{3}{2}}{1}$.
 Fig. 56. " " from above; $\frac{1\frac{3}{2}}{1}$.
 Fig. 57. " " arm-joints, profile; $\frac{1\frac{3}{2}}{1}$.

- Fig. 58. *Amphiura incisa*, from below; $\frac{9}{2}$.
 Fig. 59. " " from above; $\frac{9}{2}$.
 Fig. 60. " " arm-joints, profile; $\frac{9}{2}$.
 Fig. 61. " *ucreis*, from below; $1\frac{5}{2}$.
 Fig. 62. " " from above; $1\frac{5}{2}$.
 Fig. 63. " " arm-joints, profile; $1\frac{5}{2}$.
 Fig. 64. " sp. nov.? (Station 220), from below; $\frac{9}{2}$.
 Fig. 65. " " from above; $\frac{9}{2}$.
 Fig. 66. " " arm-joints, profile; $\frac{9}{2}$.
 Fig. 67. *Ophiochiton tenuispinus*, from below; $\frac{3}{1}$.
 Fig. 68. " " from above; $\frac{3}{1}$.
 Fig. 69. " " arm-joints, profile; $\frac{3}{1}$.
 Fig. 70. *Ophiacantha Bairdi* from below; $\frac{7}{2}$.
 Fig. 71. " " from above; $\frac{7}{2}$.
 Fig. 72. " " arm-joints, profile; $\frac{7}{2}$.
 Fig. 73. " *Bartletti*, from below; $\frac{5}{2}$.
 Fig. 74. " " from above; $\frac{5}{2}$.
 Fig. 75. " " arm-joints, profile; $\frac{5}{2}$.
 Fig. 76. " *cervicornis*, from below; $\frac{3}{1}$.
 Fig. 77. " " from above; $\frac{3}{1}$.
 Fig. 78. " " arm-joints, profile; $\frac{3}{1}$.

PLATE VI.

- Fig. 79. *Ophiacantha lineolata*, from below; $\frac{3}{1}$.
 Fig. 80. " " from above; $\frac{2}{1}$.
 Fig. 81. " " arm-joints, profile; $\frac{2}{1}$.
 Fig. 82. " *lacipellis*, from below; $1\frac{5}{2}$.
 Fig. 83. " " whole disk from above, to show the varied covering; $1\frac{5}{2}$.
 Fig. 84. " " arm-joints, profile; $1\frac{5}{2}$.
 Fig. 85. " *scolopendrica*, from below; $\frac{5}{2}$.
 Fig. 86. " " from above; $\frac{5}{2}$.
 Fig. 87. " " arm-joints, profile; $\frac{5}{2}$.
 Fig. 88. *Ophiothamnus vicarius?* (young), Station 190, 542 fathoms; $2\frac{5}{1}$. The entire back of the disk is shown, beset with shafts, each bearing a bunch of three or more sharp, slender thorns. These show the embryonic form of the thorny stumps so common in *Ophiacantha* and allied genera. Only two joints of the short arms are represented.
 Fig. 89. *Ophiomitra incisa*, from below; $\frac{5}{2}$.
 Fig. 90. " " arm-joints, profile; $\frac{5}{2}$.

PLATE VII.

- Fig. 91. *Ophiomitra incisa*, from above ; $\frac{5}{2}$.
 Fig. 92. *Ophiocamax fasciculata*, from below ; $\frac{2}{1}$.
 Fig. 93. " " from above ; $\frac{2}{1}$.
 Fig. 94. " " arm-joints, profile ; $\frac{2}{1}$.
 Fig. 95. *Ophiocopa spatula*, from below ; $\frac{4}{1}$.
 Fig. 96. " " from above ; $\frac{4}{1}$.
 Fig. 97. " " arm-joints, profile ; $\frac{4}{1}$.
 Fig. 98. " " one of the flattened arm-spines ; $\frac{1}{1}$.
 Fig. 99. *Ophiosciasma granulatum*, from below ; $\frac{5}{1}$.
 Fig. 100. " " from above ; $\frac{5}{1}$.
 Fig. 101. " " a flattened arm-spine in its skin-bag ; $\frac{4}{2}$.
 Fig. 102. " " arm-joints ; $\frac{5}{1}$.
 Fig. 103. *Ophiogeron supinus*, from below ; $\frac{2}{2}$.
 Fig. 104. " " from above ; $\frac{3}{2}$.
 Fig. 105. " " joints at tip of arm, from below ; $\frac{5}{1}$.
 Fig. 106. " " joints at tip of arm from above showing absence of upper arm-plates, and division of arm-bones into halves ; $\frac{5}{1}$.
 Fig. 107. " " joints at tip of arm, profile ; $\frac{5}{1}$.
 Fig. 108. *Ophiochondrus squamosus*, from below ; $\frac{6}{1}$.
 Fig. 109. " " from above ; $\frac{6}{1}$.
 Fig. 110. " " arm-joints, profile ; $\frac{6}{1}$.
 Fig. 111. " *crassispinus*, from below ; $\frac{7}{1}$.
 Fig. 112. " " from above ; $\frac{7}{1}$.
 Fig. 113. " " arm-joints, profile ; $\frac{7}{1}$.

PLATE VIII.

- Fig. 114. *Ophiomyxa serpentaria*, from below ; $\frac{2}{1}$.
 Fig. 115. " " from above ; $\frac{2}{1}$.
 Fig. 116. " " arm-joints, profile : $\frac{2}{1}$.
 Fig. 117. *Ophiobyrsa serpens*, from below ; $\frac{2}{1}$.
 Fig. 118. " " from above ; $\frac{2}{1}$.
 Fig. 119. " " arm-joints, profile ; $\frac{2}{1}$.
 Fig. 120. " *hystricis*, from below, showing the large tentacles ; $\frac{2}{1}$.
 Fig. 121. " " from above ; $\frac{2}{1}$.
 Fig. 122. " " arm-joints, profile ; $\frac{2}{1}$.
 Fig. 123. *Hemieuryale tuberculosa*, from below ; $\frac{3}{2}$.
 Fig. 124. " " from above ; $\frac{3}{2}$.
 Fig. 125. " " base of arm, profile ; $\frac{7}{2}$.
 Fig. 126. " " joints from middle of arm, from above ; $\frac{7}{2}$.
 Fig. 127. " " joints near tip of arm, profile ; $\frac{7}{2}$.

- Fig. 128. *Ophiobrachion uncinatus*, from below ; $\frac{1}{1}$.
 Fig. 129. " " from above ; $\frac{1}{1}$.
 Fig. 130. " " arm-joints, profile. The arm-hooks have all
 fallen, leaving their little mamelons ; $\frac{1}{1}$.
 Fig. 131. " " an arm-hook ; $\frac{8}{1}$.
 Fig. 132. *Ophiocreas spinulosus*, from below ; $\frac{3}{1}$.
 Fig. 133. " " from above ; $\frac{3}{1}$.
 Fig. 134. " " joints near base of arm, profile ; $\frac{3}{1}$.
 Fig. 135. " " joints near tip of arm, profile ; $\frac{3}{1}$.
 Fig. 136. *Astronyx Loveni* (young), from below ; $\frac{1}{2}^1$.
 Fig. 137. " " from above ; $\frac{1}{2}^1$.
 Fig. 138. " " arm-joints, profile ; $\frac{1}{2}^1$.